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*Illustrated.

THE report of the chief inspector of locomotive boilers for the year ending June 30, 1913, indicates a very considerable improvement in the condition and safety of locomotive boilers, as well as a splendid spirit of co-operation between the department and the railways generally. An abstract of this report will be found on another page of this number. It contains one radical recommendation as to the extension of the work of the inspectors. These men in connection with the inspecting of the boilers often notice defects on other parts of the locomotive and tender which may cause accidents and derailments. For some time the inspectors have been noting the more prominent of these defects and calling them to the attention of the mechanical department officers in charge. The request is now made that Congress confer sufficient authority upon the division of locomotive boiler inspection so that the inspectors may require repairs to be made to any part of the locomotive or tender which may be found in an unsafe condition. While this will increase the responsibility of inspectors and may require some additions to the force, the chief inspector is of the opinion that it will not increase the cost of the department beyond the maximum which is now fixed by law.

THE progress in locomotive design in this country during the past year has been very largely along the lines of improvement and refinement, tending toward greater economy in operation and maintenance. The rapid and general introduction of the superheater, the better understanding of the principles of combustion and how to apply them, the lessons learned from the experiments made at the locomotive testing plant at Altoona, the improved qualities of material that can now be obtained, as well as the data on the actual service of large locomotives, have all offered the designers so many opportunities and so much valuable information that the year's work has been principally that of assimilating and putting it to practical use. There has been little of a spectacular nature in the improvement of locomotives, but the advance has been real and large. Locomotives now being built haul larger trains at higher speeds, with a lower cost for fuel per ton mile, than do those built last year. They are better designed, more reliable and need fewer repairs. What has actually been done and how the results have been accomplished is told in a study of the general locomotive design situation given in this issue.

PROBABLY nothing else has excited public opinion against the railways of this country more than the periodical congestions of freight traffic familiarly known as "car shortage." Those who see in state socialism a specific for all the economic and social ills to which flesh is heir, have based on these conditions an argument for government ownership of railways. On another page of this issue we give an article from the *Journal des Transports* regarding the congestion of traffic on the Prussian state railways in 1912, which should disabuse all minds of the impression that government ownership will prevent or mitigate car shortages or congestions of traffic. The conditions which existed on the Prussian state railways in 1912, and which are described in the article referred to, probably have never been equalled in the United States for acuteness or for loss and inconvenience caused to shippers and the general public. Furthermore, the traffic congestion of last year, while the worst which ever occurred in Prussia, is by no means the first that ever occurred there. Serious congestions and delays, due to the failure of the Prussian government adequately to develop the facilities of the railways repeatedly have occurred within the last 10 years. The reader who peruses the two series of articles advocating government ownership of railways, which have been running in popular magazines, will have no difficulty in finding in them references to the car shortages in this country; but he will look in vain for any reference to the car shortages on the Prussian state railways.

COMMISSIONER PROUTY, in the New England report noticed last week, page 1201, made a significant declaration in favor of raising the mileage-ticket rate from two cents a mile to 2¼ cents. The report recognized that the change could not be put into effect at present, and perhaps not at all, because of laws in some of the states making the two-cent rate compulsory; but the fundamental economic principle—that mileage-ticket passengers could equitably and reasonably bear a larger share of the cost of maintaining the Boston & Maine, as compared with the freight traffic, and as compared with passengers who buy tickets one at a time—is explicitly recognized. This is a refreshing change from

the universal demand that passenger fares shall be forever reduced, and that the drummer, with his fictitious claim that his patronage ought to be treated as wholesale, shall have the lion's share of all reductions. On the other hand, the Railroad Commission of Louisiana in its decision reported on page 1204, surrenders completely to the drummer demand. The commissioners started out to reduce all fares from three cents a mile to 2½ cents, but the railroads and the commercial travelers got together and fixed up the usual scheme to favor them—the commercial travelers—and others who can afford to buy $25 worth of transportation at one time, and the commissioners withdrew their proposal. How will this ignoring of "the poor man" look when those commissioners are up for re-election? Still another novelty in the traffic field was noticed in our last issue: the recommendation of Hon. Seth Low, of New York, that the railways reduce passenger fares still further. The voter feels the cost of passenger fares, but does not feel the cost of freight transportation; hence a concession to him in fares will do much more good than a reduction in freight. It is gratifying to see evidence that publicists do some real thinking on this subject, and especially that so honest, broadminded and public spirited a man as Mr. Low is willing to speak his mind in public; but it is to be feared that his present dictum can only be treated as a pretty theory. Admitting that his theory has a rational basis, how far will he be willing to carry it when he sees, as he will see if he goes far in his studies, that most or all of the fares that he has in mind are already so low that the profits are almost or quite invisible? In putting freight burdens on passengers or passenger burdens on freight, a carrier can justly deal only with a community as a whole, and in dealing in that way many individual injustices are unavoidable. These injustices are tolerable only because they are small.

IN Massachusetts locomotive engineers have been annoyed by the red lights of automobiles. According to the chairman of the Massachusetts Highway Commission, an official body which deals with questions relative to the regulation of automobiles, engineers report that they have in some cases, while running around a curve, brought their trains to a stop because of a red light which they feared was a switch light. What the Massachusetts authorities are going to do about it is not stated. It has been proposed that automobile tail lights should be of some other color; but it does not seem likely that a legal requirement of that nature would be easy to enforce. Yellow is the only suitable color that is available. A law would meet with resistance or neglect, or both, and would be justly open to some objection as a disproportionate burden; thousands of lights to be changed to obviate a very few possible dangers. Again, the railroads themselves use red lights inconsistently; there were difficulties from deceptive signals before automobiles were known. And, whether the trouble be great or small, whether it be due to automobiles or to poor practice, or badly designed structures or appliances on the railroads, there is one remedial means which must always be striven for, namely, to provide fixed signals distinctive in character, and sufficient in number, to safely conduct all trains over the road in spite of outside disturbances of any kind, whether these be few or many; in spite of any number of undesired red lights. A rational and practicable fixed signal system could be made without using any red lights at all, except on high posts, in pairs; that is, arranged so that no foreign red light could be mistaken for the railroad signal. Every switch should have a distant signal. The present standard aspects of the Railway Signal Association afford nearly or quite the ideal. With signals on posts of sufficient height, the situations where automobile or other lights could confuse the aspect of these standard lights would be exceedingly rare, and could be specially provided for. There are places, no doubt, where the simplest safeguard against confusion is to provide additional fixed signal posts. The ideal signal system forbids the engineman to proceed unless he sees the all-clear (green) signal; this rule, strictly interpreted and enforced, makes the red light unnecessary (though it does not forbid the use of red as a marker); and the corollary of this conclusion is that an automobile light need not alarm the engineman. For emergency red signals—as when a track repairer must stop a train because of a washout—the invariable practice should be to swing the light; and lights on automobiles do not swing. We do not wish to do anything to encourage the automobilist to think that he can rule the railroads like a despot, as he rules the highways; but it is only reasonable to recognize that this new difficulty does not present an entirely new problem. One of the everyday problems of the locomotive runner is that of making time with a fast train in spite of the frequent occurrence of sights and sounds which *might* be taken as indications to stop or to slacken speed; and the best way to mitigate this difficulty of the runner is to give him the fullest possible assurance, when he passes a given point, that the track is clear for him to a certain given point farther on. We cannot tell him to ignore red lights; but we can make it easier for him to decide what interpretation to put on stray lights.

MR. YOAKUM'S STATEMENT.

THE *Railway Age Gazette* published last week (December 19, page 1197) the statement issued by B. F. Yoakum, chairman of the board of directors of the St. Louis & San Francisco, explaining the transactions by which the St. Louis, Brownsville & Mexico, and other railway properties in the southwest in which Mr. Yoakum and some other directors of the former road were interested, were sold to the St. Louis & San Francisco. Mr. Yoakum states that his original subscriptions to the roads which were sold to the St. Louis & San Francisco aggregated $810,833; that his total profits on the various transactions were $288,117, and that his profits in excess of 6 per cent. interest on his capital during the time it was invested in the subsidiary properties amounted to $151,152. The periods during which Mr. Yoakum had his capital invested in the subsidiary companies varied from 1901-'03 to 1909.

Mr. Yoakum argues that the construction of the small lines in the southwest by separate companies was the only practical way for developing them. Doubtless this is correct. The laws of Texas are such as to make the construction of new lines in that state by foreign corporations very difficult, if not practically impossible.

In order properly to appraise other features of Mr. Yoakum's statement it is essential to bear in mind the relation in which he stood at the time of these transactions to the bondholders and stockholders of the St. Louis & San Francisco. He was a director in the corporation, and chairman of its board. He was, in other words, the principal man whom the owners of the property had employed and trusted to protect and promote their interests to the utmost in every proper way. His obligation and duty were, therefore, to serve their interests in every way with singleness of purpose and to the very best of his ability. Above all things else, it was his function to make profits *for* not *from* them.

Now, if, in selling properties to them, in which he was interested, he had taken only the principal of and interest on his original investment, no just criticism could be made against him; he would then have neither profited nor lost by the transaction. But, according to his statement, he and his associates sold their properties to the St. Louis & San Francisco at prices which not only covered his principal and interest, but yielded a large profit besides. There are still communities where a profit, over interest, of $151,000 on an investment of $810,000 is considered quite substantial. Mr. Yoakum's course in using his fiduciary position to make this, or any, profit out of those who had employed and

trusted him cannot be defended in the court of public opinion or morals, whether it can or cannot be in a court of law.

In a mixed tone of admission and defense Mr. Yoakum says he is aware that public opinion has changed regarding many business methods, the use of which formerly was widely prevalent. That is true; but it is not defense, or even extenuation, in his case. For the transactions which have brought criticism on him were begun in 1901 and continued up to 1909. Now, the law of corporations long before the first of these years, condemned directors or other fiduciary officers of corporations who used their positions to profit at the expense of their employers, and the change in public opinion to which Mr. Yoakum alludes came long before the date on which these various deals were consummated.

Mr. Yoakum's statement is not a defense; it is a confession. He is not a victim of a change in public opinion; he is suffering from the effects of having ignored a public opinion which long had frowned on the use of such business methods as he admits having used. And while he is suffering, all the railways and railway men of the country are suffering from the undeserved odium which what is now familiarly known as the "Frisco scandal" has brought upon the entire railroad business.

Meantime, in order that no injustice may be done, it is but fair to call attention once more to the fact that under Mr. Yoakum's management the personnel of the Frisco's official staff has been of the highest character; that the property has been managed skilfully and economically and that its service has been good. In other words, criticism of the road's financial management does not imply criticism of its management in other respects, which, considering all conditions, has been excellent.

NATIONAL RAILWAYS OF MEXICO.

IN the annual report for the fiscal year ended June 30, 1913, the chairman, speaking for the board of directors, praises highly the work of the active management and especially of Mr. Brown for the services rendered in a year of very great difficulty. The praise is apparently well merited. Operating problems in the past year must have been almost innumerable and a management with less courage and less resourcefulness might well have found them insurmountable. Nevertheless, the company earned $28,685,000* in 1913, as against $30,724,000 in 1912, and after the payment of expenses, amounting to $18,122,000 in 1913, as against $19,217,500 in 1912, and taxes and rentals, there was available for interest $10,673,000, as against $10,944,000 in 1912. The saving in expenses was made entirely in maintenance of way and structures, but maintenance of way was abnormally high in 1912, because during that year the company charged the cost of replacing property destroyed by revolutionists entirely to expenses. In 1913, on the other hand, parts of the line were put entirely out of operation by the revolutionists, and during this period of enforced idleness there were no charges, of course, for maintenance.

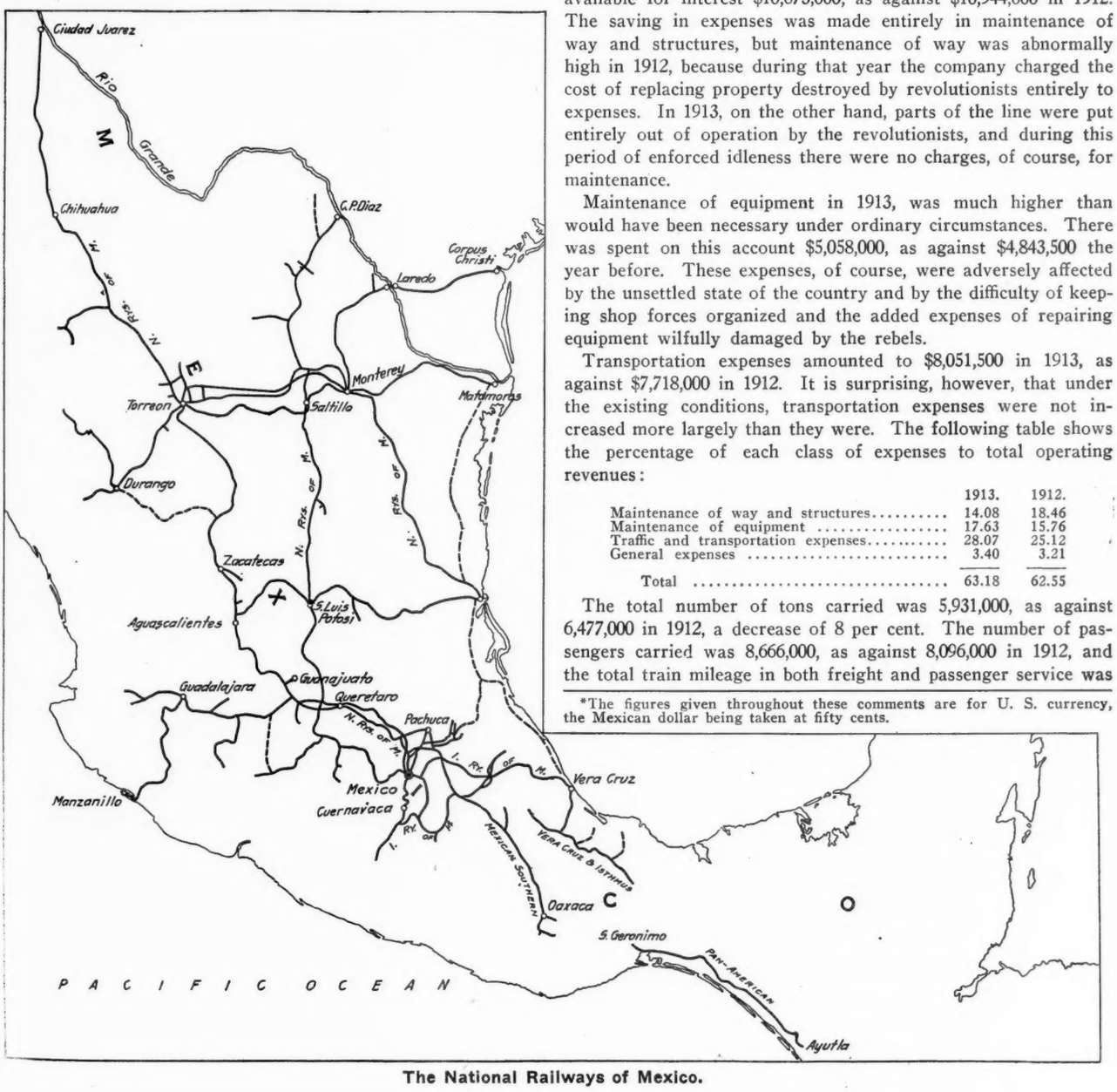
Maintenance of equipment in 1913, was much higher than would have been necessary under ordinary circumstances. There was spent on this account $5,058,000, as against $4,843,500 the year before. These expenses, of course, were adversely affected by the unsettled state of the country and by the difficulty of keeping shop forces organized and the added expenses of repairing equipment wilfully damaged by the rebels.

Transportation expenses amounted to $8,051,500 in 1913, as against $7,718,000 in 1912. It is surprising, however, that under the existing conditions, transportation expenses were not increased more largely than they were. The following table shows the percentage of each class of expenses to total operating revenues:

	1913.	1912.
Maintenance of way and structures	14.08	18.46
Maintenance of equipment	17.63	15.76
Traffic and transportation expenses	28.07	25.12
General expenses	3.40	3.21
Total	63.18	62.55

The total number of tons carried was 5,931,000, as against 6,477,000 in 1912, a decrease of 8 per cent. The number of passengers carried was 8,666,000, as against 8,096,000 in 1912, and the total train mileage in both freight and passenger service was

*The figures given throughout these comments are for U. S. currency, the Mexican dollar being taken at fifty cents.



The National Railways of Mexico.

10,209,000 in 1913, as against 11,169,000 in 1912, a decrease of 9.40 per cent. The average train load of freight on the standard gage system was 278 tons in 1913, as against 304 tons in 1912. On the narrow gage system, however, the average train load was 97 tons in 1913, as against 89 tons in 1912. The average receipts per ton per mile for all revenue freight were 1.596 cents in 1913, as against 1.502 cents in 1912. The average receipts per passenger per mile were 1.393 cents in 1913 and 1.440 cents in 1912.

One of the most interesting things about the National Railways' report for last year is the way in which gross earnings held up, even when the whole country was in a state of unrest which amounted in the northern provinces to actual revolution. Of course, some of the freight traffic was created by war conditions; but the changes in character of traffic do not indicate that this was any very large proportion of the total, and it remains true that the volume of traffic carried last year under war conditions speaks well for the possibilities of the property when the country is once more in a state of peace.

Of the total tonnage of freight carried in 1913 by the National Railways 47.31 per cent. was mineral products, 24.71 per cent. agricultural products, 11.80 per cent. products of forests, 11.69 per cent. merchandise, and 4.49 per cent. live stock and animal products. The principal change was a falling off in mineral products of from 3,223,000 tons carried in 1912 to 2,806,000 tons carried in 1913. It is rather interesting to note that coal furnished but 6.54 per cent. of the total tonnage, while ore furnished 17.71 per cent.

While from an earnings and operating point of view the results in 1913 can fairly be considered good, the financial condition of the company is not so good. If it were not for the fact that the company is a national institution which the government is under moral obligations to protect, the balance sheet might be considered showing a rather precarious situation. There was on hand $8,340,500 cash, but of this $7,647,000 was deposited for the payment of principal and interest on bonds, etc., or as a guarantee, and there were, on the other hand, notes payable amounting to $31,837,000. The profit and loss credit balance was but $49,500, while there is held in suspense interest and discount amounting to $2,053,000.

Looking back now, it seems as if the directors were hardly justified in having paid 2 per cent. dividends from profit and loss on the preferred stock, but, of course, at that time it was hoped that the company would be able to permanently finance its floating debt. The company has charged as reserve for repairs and renewals against equipment, roadway, bridges, buildings, etc., $3,809,000, and for equipment depreciation $2,460,000, and carries these amounts as liabilities. This means that when the earning power of the company is restored it is the purpose of the directors to put the actual money into the restoration of the property from earnings. There was spent during the year $1,899,500 for additions and betterments.

Since the attempted strike of the Americans in train service in the year 1912, Mexicans have been employed wherever possible, and on June 30, 1913, of the 25,852 employees in service, only 1½ per cent. were foreigners.

The following table shows the principal figures for operation in 1913 compared with 1912:

	1913.	1912.
Average mileage operated	7,094	7,047
Freight revenue	$20,184,386	$21,929,803
Passenger revenue	6,470,526	6,774,194
Total operating revenues	28,685,141	30,723,896
Maint. of way and structures	4,038,319	5,670,017
Maint. of equipment	5,058,230	4,943,560
Transportation and traffic expenses.	8,051,490	7,717,811
Total operating expenses	18,121,974	19,217,628
Taxes	211,361	239,304
Operating income	10,140,807	11,266,964
Gross income*	10,672,806	10,944,017
Net income	361,781	1,242,288
Dividends	576,658	1,153,316
Surplus	214,877†	88,972

*Rentals, amounting in 1913 to $39,125 and in 1912 to $35,107, have been subtracted before arriving at gross income, where ordinarily in these columns rentals would be included and not subtracted until after arriving at gross income.

†Deficit.

NEW BOOKS.

American Society for Testing Materials. Proceedings of the Sixteenth Annual Meeting, Atlantic City, N. J., June 24-28, 1913. Cloth, 6 in. x 9 in., 1,141 pages, illustrated. Published by the McGraw-Hill Book Co., New York. Price $5.

The complete proceedings of the sixteenth annual meeting of the American Society for Testing Materials occupy a large volume which contains a great deal of matter of interest to railway engineers. All of the committee reports and special papers presented at that meeting, with the discussions which followed, are published in full. Railway men will find of special interest, the portions referring to reinforcing bars rerolled from steel rails, wrought steel wheels, steel tires, cold rolled steel axles, specifications for cement, reinforced concrete, the Atlantic City steel paint tests, rail failures and their causes, the autoclave test for cement, and numerous similar topics.

Laboratory Manual of Testing Materials. By Wm. K. Hatt and H. H. Scofield. Size 5 in. x 8 in., 135 pages, illustrated, cloth. Published by Mc-Graw-Hill Book Co., New York City. Price $2.

This new manual of practice for testing materials laboratories is the result of developments in the laboratory of Purdue University. It was published in its original form by Prof. Hatt and later with the assistance of Prof. Scofield, was enlarged and was used in several other universities. The book in its present form has been considerably enlarged and a more complete treatment of machines and apparatus has been added. It is intended to relieve the instructor of the necessity of explaining the details of mechanical procedure, and so allow him to devote more time to duties of greater educational importance. In addition to the descriptions of materials and testing machines and the usual list of experiments which cover iron and steel, wood, cement, aggregates, concrete and road materials, four appendices are included, giving common formulae, strength specifications for steel and iron, standard forms of test pieces and strength tables.

Overhead Electric Power Transmission. By Alfred Still, Assistant Professor, Electrical Engineering, Purdue University. Cloth binding, 310 pages, 6 in. x 9 in. Illustrated. McGraw-Hill Book Co., Price $3.

"Overhead Electric Power Transmission" deals only with long distance overhead transmission lines, leaving to other volumes a discussion of distribution systems, a knowledge of which is, of course, essential to the proper consideration of the economics of transmission systems. The book is designed to reach primarily the practical engineer, and secondarily, the engineering students who wish to specialize in power generation and transmission. In showing the derivation of practical methods and formulae higher mathematics have been avoided in the effort to make the book of the most use to office engineers engaged in making the necessary calculations and drawing up specifications and for the class of engineering students mentioned. It has not been attempted to treat the subject from the standpoint of the construction engineer in charge of erection work. The book is divided into eight chapters, including Introductory and General, Principles and Theory, Economic Principles and Calculations, Electrical Principles and Calculations, Insulation and Lightning Protection, The Transmission of Energy by Continuous Currents, Mechanical Principles and Calculations, and Transmission Line Supports. In Appendix are reprinted some articles dealing with theoretical aspects of long distance transmission, also sets of complete specifications for wooden and steel tower transmission lines.

International Association for Testing Materials. Proceedings of the Sixth Congress, New York, 1912. First and second sections. Two volumes, size 6 in. x 9 in., 1,100 pages each. Illustrated. Cloth or paper binding. Published by the McGraw-Hill Book Co., New York. Price, paper binding (2 vol.), $7; cloth binding (2 vol.), $8.

The proceedings of the last congress of the International Association for Testing Materials are presented in two large volumes and contain all of the papers and discussions which were pre-

sented before that meeting. The first section includes the report of the organization and the opening and closing sessions of the congress, all of the papers on metals and the discussions of section A, which covers metals. The second section contains the papers on cements, stones and concrete, the discussions of section B covering these subjects, and the papers and discussions of section C covering miscellaneous subjects. These proceedings are published in English, but are also available in German and French.

Suspension Bridges. By William H. Burr, professor of civil engineering, Columbia University. Size 6 in. x 9 in. 417 pages. Illustrated. Cloth bound. Published by John Wiley & Sons, New York. Price $4.50.

"Suspension Bridges" was prepared for use as a text book in bridge engineering and with this in view particular emphasis has been given to elucidating general principles. The author has endeavored to treat each main structure in a general way so as to cover all desired special cases. In order to make the numerous formulae required for the analysis of indeterminate structures readily applicable in actual practice, many numerical tables have been added with the hope that they may be found useful by practicing engineers. The treatment brings out the two generally accepted methods of analyzing stiffened suspension bridges, the one based upon the principle of least work and the method of deflections. The comparison of the results secured by these two methods and the greater ease with which the equations in the former method can be handled leads the author to favor it in his discussion. The chapter heads, which are suggestive of the scope of the work, are as follows: Suspension Bridges; Statistically Indeterminate Stiffening-Trusses; Theory of the Straight Stiffening-Truss Based on the Method of Deflections; Thermal Stresses; Arch Ribs Treated by Graphical Methods; The General Analytic Theory of Elastic Arch Ribs According to the Law of Least Work; Three-Hinged Arch Rib; Braced Spandrel Arch, and Cantilevers.

Year Book of the American Society for Testing Materials. Size 6 in. x 9 in., 401 pages, illustrated, cloth. Price $5. Published by the secretary, American Society for Testing Materials, University of Pennsylvania, Philadelphia, Pa.

Departing from the practice of last year when the proceedings of the society and the year book were published in one volume, the proceedings of the society are not included in this year book, which is devoted entirely to the standard specifications of the society in their latest revised forms. These standard specifications include those for Bessemer steel rails; open hearth steel rails; medium carbon, high carbon and extra high carbon steel splice bars; structural steel for bridges; forged and rolled, forged, or rolled solid carbon-steel wheels for engine, truck tender and passenger service, and also for freight car service; also specifications for wrought iron; for locomotive materials, for cement and for structural timber and yellow pine bridge and trestle timbers. Representative specifications for carbon steel rails and for steel railway bridges are reprinted from the Proceedings of the American Railway Engineering Association, and there are also included the specifications of the Association of American Steel Manufacturers for Bessemer steel rails, structural steel and boiler steel, and those of the United States Steel Products Co. for Bessemer and open hearth steel rails. These standard specifications, covering a wide variety of subjects in engineering and railway practice, and included in one volume, make it a valuable book for reference.

Strength of Materials. By Mansfield Merriman. Sixth edition, revised. Illustrated. Bound in cloth. 166 pages. 5 in. x 7½ in. Published by John Wiley & Son, New York. Price $1.

Merriman's Strength of Materials is too well known as a text book to require any extended description. The first edition was issued in November, 1897, and it has now passed to the sixth edition, each being revised to keep pace with the advance of knowledge in this field. In the fifth edition a new chapter was added on reinforced concrete, especially columns and beams, and in the sixth a new chapter on combined stresses has been added. Numerous changes have been made throughout the book and many new problems have been introduced. This standard work offers an opportunity for the study of the strength of materials, beams, columns and shafts which may be understood by those not acquainted with calculus. The degree of mathematical preparation required for an understanding of the problems presented is merely that now usually given in high schools. The book deals mainly with questions of strength, the subject of elastic deformations occupying a subordinate place. Since the deductions of the deflection of beams are best made by calculus, they are not here attempted, but the results are stated so that the pupil or reader may learn their uses. A chapter on the manufacture and general properties of materials is given as well as one on resilience and impact.

American Railroad Economics. By A. M. Sakolski, Ph.D., Staff Lecturer in New York University School of Commerce, Commerce Accounts and Finance. Published by the Macmillan Company, New York. Cloth, 12mo, 295 pages. Price $1.25.

This is a text book for investors and students, the product of the author's activities as an investment analyst in New York, and as a lecturer on transportation economics. In this volume the railroads are studied as business enterprises. Their operations and activities are equalized and interpreted from an economic and financial viewpoint which involves consideration of legal, statistical and accounting matters. The material is classified under four heads: Data regarding the character of the transportation facilities, including an analysis of the physical features of railways, insofar as they influence operating results; data measuring efficiency and economy of operation, including a consideration of traffic and mileage statistics; data measuring revenues, expenses and net earnings, including a study of the income account and the profit and loss account; data measuring the capital investment in relation to the corporate resources and liabilities, including an analysis of capitalization and the general balance sheet. One chapter is devoted entirely to the Interstate Commerce Commission system of accounting, including the motives for the formulation of the system and a discussion of some of the various opinions on different features of the commission's system. The book should be of great value to railway investors and other persons who have occasion to study railway annual reports, and particularly to the student of railway affairs.

The Metallography of Iron and Steel. By Albert Sauveur. Size 7¼ in. x 10½ in., 436 pages, 366 illustrations, cloth bound. Published by Sauveur & Boylston, Cambridge, Mass. Price, $6.

This work, is, so far as is known, the first comprehensive treatment of its broad and important subject. The rapidly increasing attention that is being given to the processes of manufacture of iron and steel for the purpose of securing the best available products, should make it of real value to many engineers and railway men. The book is divided into a series of 24 lessons and two appendices, the lesson form of treatment being adopted with a view to the needs of men seeking self-instruction in metallography, although the work is equally well adapted for a text book and should be found valuable by manufacturers and users of iron and steel and expert metallographers. The thoroughness with which the subject is covered is best indicated by the list of titles for the 24 lessons, the more important of which include pure metals, pure iron, wrought iron, low carbon steel, medium high and high carbon steel, impurities in steel, the thermal critical points of iron and steel, cast steel, the annealing, hardening and tempering of steel, special steels, cast iron, malleable cast iron, constitution of metallic alloys and the phase rule. The appendices cover manipulations of apparatus and nomenclature of the microscopic constituents. An introduction covers descriptions of the apparatus used in metallographic laboratories. The illustrations, and particularly the photomicropraphs, are especially noteworthy. The book is printed on the best quality of coated paper, which makes possible the use of the best grade of half-tones, and the author has taken great pains to secure the best available illustrations from whatever source.

Letters to the Editor.

PROBABLE RESULTS OF GOVERNMENT OWNERSHIP.

Chicago, November 28, 1913.

To the Editor of the Railway Age Gazette:

After reading the discussions pro and con (mostly con!) anent government ownership of railways which have appeared of late in the public prints, one is inspired with awe on approaching so august a subject. Like the pious follower of Mahomet at the shrine at Mecca one approaches in fear and trembling because of the mystery surrounding it and the uncertainty as to what it may bring forth—in figures.

The latest pronunciamento from the camp of statesmen, senators, office holders, etc., is that the railroads of the U. S. A. can be bought for 19 billions (it takes less space in words) of dollars. Of anything like a basis in fact this statement is, of course, entirely innocent. Why not satisfy our taste for jugglery by making it 20 billions of dollars? A billion more or less is a mere bagatelle, and if we do not descend into vulgar fractions 20 has twice as many factors as 19, and accordingly offers several times as many opportunities for combinations.

Neither this government, nor for that matter any other government on earth, could borrow 20 billions of dollars in money for any purpose. What would happen would necessarily be an exchange of securities. Somebody would want to trade Penna 4½s selling at 100, or U. P. 4s selling at 95 for government bonds selling at 100 and only paying 3 per cent.

The next line of argument is that the security is better. Why would the government bond secured by the above properties and others not so valuable be given the preference? The real reason is because the government bond is not taxable. The difference in price between securities of the above variety and those issued by the United States is largely due to that element. If the government should undertake to issue bonds paying less than about 4¼ per cent. in order to sell at par, the security underlying these bonds would not only have to include all the railroad property of the country, but also the non-taxable feature. Judging by the press notices our statesmen expect to make these bonds a general liability of the government in addition to the security furnished by the railroad property. In this case everybody, including the holder, may be taxed in order to make up the deficit if the railroads do not pay under government management.

In the opinion of most people who follow public matters our governmental affairs are not likely to become less expensive. This money must be raised by taxation under our present system. The railroads pay as taxes in the different states approximately one hundred millions of dollars per year. One state derives six millions and several five millions from this source. One hundred million dollars is one-half of 1 per cent. on the aforesaid 20 billions.

I do not know what the average personal property tax would be for the entire country, nor what proportion of railroad securities is held in America, but when we consider the different varieties of franchise taxes, income taxes, direct personal property taxes and our complicated system of erecting the taxation pyramid, it would appear that 1 per cent. per year on the 20 billions is a conservative estimate. If the railroads do not produce this money for the public, the public will have to tax itself.

For 1910 the net operating revenue from rail operations was 928 million dollars. This is 4.64 per cent. on 20 billions. A great many arguments can be made on the subject of the government issuing bonds at low rates, but among the well-informed the opinion seems to be that a non-taxable (and otherwise exempt) bond would have to bear 3½ to 3¾ per cent. in order to sell at par. In other words, the cost of the government ownership will be (on 20 billions):

Interest	3.5 per cent.
Taxes	0.5 per cent. (State on railroads direct.)
Taxes	1.0 per cent. (Estimate on personal property.)
Total	5.0 per cent.

This is 0.36 per cent. more than for the year 1910, a banner year. The public loses 0.36 per cent. on this immense capitalization unless it can operate the railroads more economically than under private ownership. Does any one believe that this can be done? It is being tried in numerous instances at the present time. The records show that in every case public ownership is more costly than private, even where there is no political interference. We are conducting public business in this country in a very wasteful manner at present. Why should we expect a new undertaking to be different? A good deal is being said about high salaries. If all the general officers were dismissed as useless it would save 18 millions a year. If the same amount was saved in the soliciting of business and 4 millions in the legal department, the entire sum would only be 0.2 per cent. on 20 billions.

Because we have made a bad mess of regulation by having about 50 boards of regulators, that is not a good reason for public ownership. The thing to do is to eliminate about 49 of them. We would then have regulation founded on knowledge which would be applied with wisdom in the long run. The advocates of public ownership say this cannot be done. What chance has a government, which involves itself with legal fictions to such an extent that it cannot extricate itself, got to run a complicated business of immense proportions without getting in a similar tangle? As a matter of fact, all railroads are interstate, that is all of standard gage that handle all the business offered. A man in a small Texas town on a small railroad entirely within the state buys a piano from a dealer in Dallas. Some want to call that intra-state commerce. The piano probably travelled over ten states before reaching Dallas, and the value of the small road lies largely in the fact that it can ship to or receive goods from any point on the map.

The post office is frequently cited as one of the finest exhibits of public ownership. We all know that it usually has a deficit annually. No account is taken of the interest on the appropriations for buildings in making up a balance sheet. The R. F. D. operates over roads that are maintained by taxation. The public pays the bills in the end. The same rule would hold good for a railroad. It must meet all charges, or its indebtedness will be distributed among the citizens at large. The man who would benefit would be the large shipper. The ultimate consumer of few articles which must be transported would find himself in the position of holding the bag for the big fellow.

The whole proposition looks like a sugar-coated pill so far as the public is concerned. No doubt a certain proportion of the people would like to have the balance help them make money by footing the loss on their freight bills, but that is not a very good reason from the other man's point of view.

Paul M. La Bach.

A New Station in Belgium.—The government of Belgium has just completed the construction of a fine new station in Ostend, described as of great architectural beauty. The railway has been extended from the station to the new quay, so that passengers pass to and from steamers under shelter. In connection with the new structure, and having access from it, there is a hotel managed by the International Sleeping Car Company.

The Railways of Victoria.—Victoria has the largest population of the Australian states, although it is the smallest in area, except Tasmania. All of its public railways, excepting a short line of 14 miles, are now owned and controlled by the state. They are managed by a board of three commissioners, who have supreme control of the administration, and are free from political interference. The construction of new lines, however, is undertaken by the Railway Construction Branch under the control of the Board of Land and Works, which transfers the lines to these three commissioners after completion. During the year ending June 30, last, a length of 25 miles of new line was opened for traffic; 242 miles was under construction at the close of that period. The mileage now open is 3,648 miles.

PROGRESS IN LOCOMOTIVE DESIGN.

Improvement and Refinement Tending to Greater Economy in Operation Is the Basis of the Designers' Study and Output.

The past year has brought important but not spectacular developments in locomotive progress. There has been much concentration on more effective use of fuel through fuel saving devices and capacity increasing factors and a marked tendency toward maximum power per unit of weight has developed. The important and helpful tendency toward co-operation on the part of engineers of the supply interests should be recognized and is being encouraged.

In a general way, the progress can be indicated and the present situation demonstrated by the following:

(1) Locomotives of the largest size for the different classes of service continue to be built almost exclusively. A beginning has been made toward applying the most economical arrangements and proportions to the lighter locomotives.

(2) Boiler capacity per pound of metal in the boiler has been decidedly increased by the use of larger fireboxes and combustion chambers, thus giving time for the completion of the gas reactions before the flues are reached. Shorter flues, giving a higher rate of evaporation per unit of area, are the result in some cases. Flues, however, is no case, are shortened from the front end and, having the size of firebox and combustion chamber desired, the flues are made as long as the weight limits will permit.

(3) Cylinders are increasing in relative size due to the lower steam consumption at shorter cut-offs when using superheated steam. Stokers are also causing enlarged cylinders because of the increase in the maximum boiler capacity.

(4) Heavier weights are being placed on drivers in connection with the lighter weights of reciprocating parts.

(5) Superheaters and brick arches are almost universally applied to new locomotives and are also being installed on many older designs.

(6) Standardization of the parts most frequently requiring repairs and the use of these parts on new locomotives as far as possible, is being more widely practiced.

In these days of diminishing and disappearing net earnings, higher average train loads must be handled. Locomotives are now being called on for results which but a few years ago would have seemed absolutely impossible. The locomotive designers are meeting the demand and are producing Atlantic type locomotives which do as much work and haul as large trains as the Pacific type did two years ago; consolidations which perform the service that demanded Mikados in 1911, and all classes which will pull from 10 per cent. to 30 per cent. larger trains on the same amount of coal used two or three years ago. At the same time, if allowance is made for increases in wages and the increased cost of material, the cost of repairs per unit of work has been actually decreased.

The general use of the superheater and brick arch is largely responsible for this improvement, but the adjusting of all parts to the best relationship, one with the other, has been effective in continuing the improvement.

In general the problem has been to obtain the greatest drawbar pull at the highest practical speed for the service with the least total weight of locomotive. Sustained drawbar pull depends mostly on boiler capacity, and in this direction great strides are being made. While the ratio of output in steam to the weight of the boiler is increasing, still the total weight of the boiler also continues to increase. This, in turn, means greater weight on the wheels, most of it coming on the drivers. In high or moderate speed service the permissible dead weight on drivers is controlled by the hammer blow of the excess weight in the counterbalance which is controlled by the weight of the reciprocating parts. The weight of these parts is dependent on the amount of power delivered by the cylinders, and thus the cycle is complete.

Better quality of material allows some saving of weight, and when combined with perfect design, it has permitted the use of larger boilers and heavier dead weight on drivers without exceeding the safe limits.

While there has not actually been built this year a locomotive which exceeds in total weight the 2-10-10-2 type built by the Santa Fe in 1911, which weighs 616,000 lbs., or the Virginian 2-8-8-2 type built by the American Locomotive Company in 1912, which weighs 540,000 lbs., still the average weight of new locomotives built continues to increase. Selecting ten typical examples of the 2-8-2 type built during the year, shown in the accompanying table, the average total weight is seen to be 293,020 lbs. The average for ten Pacific type engines is 273,130 lbs., and for four typical consolidations the average weight is 246,875 lbs.

Synopsis.

Introductory.
Few Mallet Locomotives Built.
Economy and Capacity.
Standardization.
Boilers Better Proportioned.
Larger Cylinders.
Valve Gear.
Use of Alloy Steels.
Improvement of Minor Parts.
Mechanical Stokers.
Few Compounds Built.
Pennsylvania Atlantic Type.
Powerful Consolidation.
Assistance of Supply Companies.

FEW ARTICULATED LOCOMOTIVES BUILT.

Comparatively few locomotives of the articulated type have been ordered during the past year. There appear several reasons for this: First, those companies that have physical conditions which can best be met by the use of the large Mallets have already a sufficient number in service for their requirements. Second, the increased capacity of the Mikado type made possible by the application of a stoker and superheater. Third, the revival of the Santa Fe type, also made possible by the stoker. Fourth, the general spirit of conservatism that has marked the whole locomotive situation during the year.

The Mallets ordered are all of the compound cylinder arrangement. Experience with simple Mallets has not led to any extension of this arrangement.

An articulated locomotive of very unique arrangement is being designed by the Baldwin Locomotive Works for the Erie Railroad. This locomotive will be of the 2-8-8-8-2 type, having three pairs of equal size cylinders, each being 36 in. in diameter by 32 in. stroke. The first two pairs of cylinders will be located and arranged in much the same manner as an ordinary Mallet type locomotive. The third pair of cylinders will be placed under the front end of the tender frame and will connect to four pairs of drivers under the tender. The trailer truck is also to be under the tender. The arrangement provides for compounding at the ratio of 2 to 1, and the center pair of cylinders is to use high pressure steam. One high pressure cylinder will exhaust to a receiver pipe which supplies the steam for two other cylinders. The right one, for instance, will supply the two cylinders under the tender and the left one the two cylinders at the front end of the locomotive. The exhaust from the cylinders under the

tender is to heat the water in the tank and such surplus as is not required for that purpose will be discharged to the atmosphere. Exhaust from the cylinders at the front end will probably be used to furnish the draft.

This locomotive is to have as large a boiler as can be applied within the clearance limits and the preliminary design provides for a tractive effort of about 160,000 lbs. working compound. The total weight of the engine will be in the neighborhood of 800,000 lbs. These locomotives, if finally built, will, of course, far exceed in weight and size anything that has heretofore been constructed.

ECONOMY AND CAPACITY.

Each year sees a more careful analysis of the service that the locomotives are to perform before the design is actually outlined and, while, so far, it has seemed advisable to design and build locomotives for the heaviest class of service on the road and to relegate the older power to the lighter service, a movement is beginning which will lead to the building of lighter locomotives suited for a particular class of service on branch lines or on certain divisions. The beginning of this movement is seen in the application of superheaters to lighter power as it goes through the shops for general repairs, and the improvement of the valve gears and the installation of brick arches. It is probable that within the next year or so orders will be given for lighter locomotives which will have the benefit of the more advanced knowledge of design and arrangement, and thus will give the economy which is now obtained only from the newer and most powerful locomotives on the road.

In fact, the past four or five years have been devoted almost entirely to obtaining increased capacity. Advances in economical features, which have been so numerous, have all been applied to this end. The demands in this direction seem to be now pretty well taken care of and attention is beginning to be given to greater economy for the saving it gives, which means the same amount of power now obtained, if that is all that is needed or desired for the service, with a distinctly reduced fuel consumption and weight of locomotive.

The new Atlantic type locomotive on the Pennsylvania, which is the most notable locomotive design of the year, is an indirect example of this, since it performs better service with a smaller consumption of fuel than a Pacific type which weighs about 60,000 lbs. more. Some recent consolidations, where they have been designed to do and are doing the work that has previously required the 2-8-2 type, are also examples of the same tendency.

There has been, recently, a very general movement on all the more progressive roads to improve the older locomotives, so far as possible, and bring them up to nearly the state of efficiency and capacity possessed by the more recent designs. This is probably best marked by the many applications of superheaters to old locomotives as they pass through the shop for general repairs. This same movement has begun with stokers on the larger capacity locomotives. When superheaters are applied it is not infrequent to apply a new valve gear and to enlarge the cylinders somewhat.

This idea, in some cases, is even carried to a greater extent and consolidation locomotives are being entirely rebuilt and changed to the Mikado type. The most prominent example of this action has been on the New York Central, where a total of about 150 locomotives have been altered from 2-8-0 to the 2-8-2 type. The result has been an increase of fully 33 per cent. in the capacity of the locomotive which has been obtained at a very reasonable cost.

STANDARDIZATION.

Extension of the practice of standardizing many parts of the locomotive, particularly those requiring frequent repairs or renewal, is general. Even the practice of standardizing whole locomotives so as to greatly reduce the number of classes in service, with an accompanying large improvement in the maintenance account and in the conditions of operation, is found on the more progressive roads.

H. H. Vaughan, assistant to the vice-president, Canadian Pacific, indicated the advantages of fully standardized locomotives at a meeting of the American Society of Mechanical Engineers to be: Standard locomotives can be transferred from one part of the road to another without a large storehouse stock; continued construction of the same locomotives reduces the cost of building as well as of the later repairs; it is possible to effect desirable variations in design much better than can be done when classes differ. It was also pointed out that the time for standardization is before the locomotives are built and not after they are running.

There has not been so great a tendency toward standard classes as appears in respect to standard parts. In a number of cases new locomotives have been built which required little more than a new design of boiler, frames and cylinders.

BOILERS ARE BETTER PROPORTIONED.

While each and every part of the locomotive has been subject to careful scrutiny and decided improvement, the boiler has been the point of most searching investigation and greatest advance. The goal of boiler designers is to obtain the largest number of pounds of steam to each pound of metal in the boiler. The various studies and experiments have clearly indicated the advantage of the use of a longer flameway between the fuel bed and the end of the tubes, giving an opportunity for completing the gas reaction before the products of combustion enter the flues.

Experiments on the locomotive testing plant at Altoona as reported to the Master Mechanics' Association show that boilers with short tubes have a distinct advantage in increased activity of combustion and in the rapidity of evaporation, or free steaming, but at the same time they also have a slightly lower efficiency since they absorb less of the total heat available during the passage of the gases through the tubes. It thus seems that the most desirable length of tube depends on how much one is willing to sacrifice in boiler efficiency to obtain rapid evaporation with some loss of heat. Experiments indicated that the rate of evaporation increased as the tube is shortened until it reached a maximum at a length between 12½ ft. and 14 ft.; after that it decreased rapidly. This information, taken in conjunction with the results of the experiments made at Coatesville in June, 1912, showing the comparative value of firebox heating surface and tube heating surface have had a noticeable affect already in increasing the use of combustion chambers with shorter flues.

The Pennsylvania has adopted a length of 15 ft. for 2 in. flues and a length of 19 ft. for 2¼ in. flues.

Speaking on this subject before the American Society of Mechanical Engineers, F. F. Gaines, superintendent of motive power of the Central of Georgia, stated that: "The most radical improvement that can be made on locomotives, and one which will be rapidly developed, is the use of greater firebox volume and heating surface. This is readily obtained by using a suitable grate area and combustion chamber. In fact, from past experience it would not be surprising if ultimately a flue length of 16 ft. would become a desirable maximum and the combustion chamber be substituted for the remaining distance." Experiments that have been made by Mr. Gaines with a type of combustion chamber developed by him indicate the truth of his assertion.

While no distinct movement toward reducing flue length to 16 ft. can be discovered, there is a noticeable tendency to increase the firebox heating surface, and this is being done both by the addition of a circular combustion chamber and, where possible, by the use of a firebox arranged on the Gaines principle.

Brick arches, supported on arch tubes, are now in very general use on all classes of locomotives. An appreciation of the value of the heating surface in the arch tubes is becoming more apparent and the objections that had previously been made to them seem to have been entirely overcome.

Openings for the admission of air into the ash pan and through the grate are, in a few instances, being given the attention they

deserve, and in recent designs, which follow the best practice, as large an air inlet as possible is given. The opening should be 50 per cent. of the grate area, or more, if possible, on road engines. More study should be given this most important subject, and it is probable that the most marked advance in locomotive operation in the coming year will be along the lines of securing more perfect combustion.

Experiments with a powerful passenger locomotive on the Altoona testing plant early in the year indicated the importance of further study of the nozzle, stack and cylinder passages. This has already had its effect and the present practice is to place the nozzle as low as it is possible to get it. Where the boiler is large in diameter, the internal extension of the stack is universally used in order to obtain the required length. The use of nozzle tips in shapes other than round has shown a distinct improvement in the exhausting of locomotives under certain conditions. It appears that by the proper selection of the shape of the nozzle tip and the use of tips other than round are of great value in compensation for a poor arrangement of exhaust passages which in some cases is unavoidable on account of the lack of room. These nozzles in some instances have shown a surprising reduction in the coal consumption and an increase in power in the cylinders.

The study given to this feature has also led to a better design of the exhaust passage in the cylinder itself, with a still further reduction in the back pressure.

At the Traveling Engineers' Convention, in the discussion of the report on operating superheater locomotives, it appeared that the best practice, in the opinion of those discussing the paper, was to use a full throttle opening up to the point where the cut-off was 25 per cent., and if a longer cut-off than this is necessary the throttle should be partially closed in preference to lengthening the cut-off. This, of course, means larger diameter cylinders if the full power of the locomotive is to be developed.

Larger cylinders, if they were to be used with late cut-offs, would imply the necessity of larger steam and exhaust ports, and thus larger piston valves. Since, however, they are being used entirely with the idea of using the short cut-off and the period of admission of the steam is at a time when the piston is moving slowly, there has been no noticeable movement toward larger valves. In fact, the tendency is more toward an improvement in the valve gear to give a larger port opening for both admission and exhaust, which allows the use of even a smaller diameter of valve. On one road the 12 in. diameter piston valve is being used with superheated steam on practically all sizes of cylinders, and no trouble is found in holding up the steam pressure during the first 30 per cent. of the stroke. While 16 in. diameter piston valves have been used in a few cases, the general tendency is toward a smaller diameter and a more careful design of the valve gear.

On the Norfolk & Western, the Hobart-Allfree cylinders which provide an auxiliary exhaust opening and a reduced back pressure are being used on all new simple locomotives and are being applied to the older power as it requires new cylinders.

TYPICAL MIKADO TYPE LOCOMOTIVES BUILT DURING 1913.

	Weight in Pounds.										Heating Surface.				Tender.		Wheelbase.	
Design No.	Truck.	Drivers.	Average per axle.	Trailer.	Total.	Cylinders Diam. and Stroke, in.	Diam. Drivers, in.	Steam pressure, lb.	Tractive Effort, lb.	Grate Area, sq. ft.	Tubes, sq. ft	Firebox, sq. ft.	Total, sq. ft.	Superheater, sq. ft.	Coal (tons).	Water (gal.).	Driving, ft. and in.	Engine, ft. and in.
1	27,500	245,000	61,250	49,500	322,000	27x30	63	190	56,100	59.6	4,494	218	4,740	1,084	12	7,500	16-6	36-1
2	30,500	240,500	60,125	49,000	320,000	28x30	63	180	57,200	70.4	3,266	290	3,591	846	16	10,000	16-6	35-3
3	29,000	238,200	59,550	52,100	319,300	28x30	63	180	56,500	63.0	4,017	230	4,276	898	16	9,000	17-0	35-2
4	37,600	228,200	57,050	52,600	318,400	27x30	62	190	56,000	62.0	4,547	274	4,821	1,101	12.5	8,000	16-6	35-2
5	28,000	233,500	58,375	45,500	307,000	28x30	63	185	58,700	57.1	4,095	224	4,339	953	15	8,500	16-6	34-11
6	28,000	227,500	56,875	46,500	302,000	27x32	61	170	55,300	63.1	3,939	230	4,198.6	890	13.3	8,275	17-6	36-5
7	27,000	214,500	53,625	46,000	287,500	26½x30	61	185	54,500	57.5	3,379	227	3,634	831	14	8,500	16-6	35-1
8	26,000	213,500	53,375	43,500	283,000	27x30	63	175	51,700	56.5	3,397.8	214.8	3,639.3	757.3	15	9,000	16-6	35-1
9	24,600	213,200	53,300	44,000	213,200	26x28	63	200	51,000	71.5	3,972	242	4,214	890	15	9,000	16-6	35-2
10	23,700	201,700	50,425	32,400	257,800	23½x32	63	180	42,900	49.3	3,403.4	200.3	3,603.7	566	16	7,000	16-6	35-5

Various arrangements of blowers or suction fans for giving the required draft through the tubes have not passed beyond the experimental stage, and there has been no evidence presented as to what practical advantages such an arrangement might have.

Circulation throughout the whole boiler is being improved as the effect of improper flue spacing, narrow passages and trapping of water near hot sheets is better understood. The value of the arch tubes as circulation improvers is but beginning to be appreciated.

LARGER CYLINDERS.

One of the changes in proportions which has been found advisable in order to obtain the full advantage of superheated steam, is the use of larger cylinders. At first this was accompanied by a reduction in the steam pressure and the increased size of the cylinders was simply to obtain the full power with the lower pressure. Lately, however, a tendency is noted toward using larger cylinders, even with the high pressures, and some of the more recent designs would, at first sight, seem to be considerably over-cylindered. Here again it is the results from the Altoona locomotive testing plant that have pointed to the best practice. The conclusions reported to the Master Mechanics' Association of tests on Atlantic and Pacific type locomotives stated that for maximum economy with superheated steam the maximum indicated horsepower should be developed at a cut-off not exceeding 30 per cent.

VALVE GEAR.

While the Walschaert type of valve gear is used on a very large majority of the locomotives, including all types, the Baker valve gear has been applied in a number of cases and at the present time there are about 2,000 locomotives operating in the country with this type of gear. New arrangements of valve gear seem to be attracting the attention of designers, and two or three original constructions have appeared during the year but, so far, are only in experimental service.

The improvements in the Walschaert gear have all been along the lines of the use of better materials and thus of lighter parts, and the more rigid support of the valve-stem crosshead. The screw reverse gear has met with quite general favor and is being applied to many of the larger types of simple locomotives. On Mallet engines and some of the very large examples of the Mikado and Santa Fe types, power reverse gears have also been applied. A screw reverse was applied to some switching locomotives on the Illinois Central early in the year, and it is reported to be a satisfactory arrangement for this service when compared with the usual hand-operated lever arrangement.

On the Philadelphia & Reading a new arrangement of reverse gear which combines both the screw and lever designs was applied to an inspection locomotive. With this construction the complete reversal of the engine can be made promptly by means

of the lever in the ordinary manner and the adjustments of cut-off are made by the screw.

USE OF ALLOY STEELS.

Alloy steels are being more widely used for many of the locomotive parts. In most cases the heat-treated steel is employed and very excellent results are reported. In a few cases a considerable reduction of section and of weight has followed the use of this improved material. More generally, however, the greater strength has been used for the purpose of reducing the unit fiber stress and thus increasing the reliability of the parts. The Pennsylvania allows 25 per cent. higher stress in piston rods and pistons when heat treated steel is used. This followed tests which showed the elastic limit of the material employed to be 50 per cent. greater than the non-treated steel.

The alloy most generally employed has been a chrome vanadium. The number of parts of this material applied during the year to locomotives is given in the following table:

	Number of Engines.	Number of Parts.
Axles	466	1,277
Crank pins	188	580
Piston rods	69	138
Main rods	347	734
Side rods	354	1,840
Springs (engine and tender)	306	...
Frames	776	1,592
Engine truck axles	62	62
Wheels	...	700
Tires	...	1,000

Important improvements have been made in the connection between locomotive and tender, allowing greater freedom of relative movement without the presence of any lost motion.

There is no general tendency noticed in respect to any important changes in the tender. The sizes remain about the same as the last two or three years, and a capacity for 7,500 to 8,000 gals. of water and 13 to 14 tons of coal is normal for the modern heavy locomotive. Coal pushers have been applied in some cases, and materially assist the fireman. New designs of tender truck have appeared on some roads, which usually are intended to increase the strength and better riding qualities. The Santa Fe has applied some six-wheel trucks to tenders for passenger locomotives but, so far, is alone in this practice.

STOKERS.

During the past year the service of the stokers previously applied and of the large number placed in service during the year, prove that this device has passed the experimental stage. Thus, after 25 or 30 years of experiment, the stoker has reached the position of reliability and serviceability which allows it to be accepted with confidence for use on the larger sizes of locomotives. This is probably as important a development as has occurred this year since it removes one of the greatest limitations in the way of further increase in the size of locomotives. The service results of the stoker indicate that the capacity of the locomotive as to maximum tonnage and speed will be increased by it in much the same way as has occurred by the application of the superheater.

TYPICAL PACIFIC TYPE LOCOMOTIVES BUILT DURING 1913.

Design No.	Weight in pounds. Truck.	Drivers.	Average Per axle.	Trailer.	Total.	Cylinders, Diam. and Stroke, in.	Diam. Drivers, in.	Steam Pressure, lb.	Tractive Effort, lb.	Grate Area, sq. ft.	Heating surface. Tubes, sq. ft.	Firebox, sq. ft.	Total, sq. ft.	Superheater, sq. ft.	Tender. Coal (tons).	Water (gal.).	Wheelbase. Driving ft. and in.	Engine, ft. and in.
1	46,100	189,500	63,167	57,600	293,200	26x26	80	205	38,000	55.4	3,453	204	3,680	845	17.3	8,000	13-10	35-2½
2	46,500	185,500	61,833	56,000	288,000	25x28	73	200	40,500	94.8	3,579	239	3,857	821	10	9,000	13-0	34-10
3	47,500	186,500	62,167	50,000	284,000	25x28	69	200	43,100	58.0	3,727.6	199	3,954	867.8	14	8,000	13-0	33-10
4	51,300	179,900	59,967	50,800	282,000	27x28	73	185	43,500	59.6	3,535	220	3,786	879	14	8,000	13-0	34-1
5	53,000	174,500	58,167	54,000	281,500	25½x28	73	190	40,250	63.0	3,259.4	212.8	3,497.6	805	14	8,500	13-0	33-10
6	56,400	164,100	54,700	51,200	271,700	17½ & 29x28	73	210	34,000	57.6	3,233	181	3,444	619	12	9,000	13-8	35-1
7	50,000	172,000	57,333	49,000	271,000	23½x26	79	200	30,900	56.5	3,192.9	204	3,424	774	12	7,500	14-0	36-6
8	49,600	165,500	55,167	44,700	259,800	25x28	72	180	37,000	66.7	3,553	241	3,823	842	14	8,500	13-0	34-1
9	49,000	154,000	51,333	48,500	251,500	24x28	73	200	37,600	53.2	3,092	188	3,309.3	780	13	6,000	14-1	34-5½
10	49,300	159,200	53,067	40,100	248,600	24x28	76	185	33,500	56.5	2,359	185	2,567	587	16	7,000	13-2	34-3½

The frames are simply annealed, but all other parts are heat-treated.

IMPROVEMENT OF MINOR PARTS.

Improvements of many of the minor details tending toward a greater reliability, reduction of cost of repairs or increased convenience have been general. Steam pipes extending through the front end and connecting to the top of the steam chest are used in a majority of cases, thus reducing the weight of the cylinder castings and improving the steam passages and the quality of the steam. Driving boxes with a length of bearing on the journal much greater than in past practice have been developed by the American Locomotive Company and applied to a large number of heavy passenger locomotives. Pressed steel is being used for bumper beams and for the pilot in place of wood on many of the recent locomotives. Improved arrangements for holding the piping have been developed on the Lake Shore and have drawn attention to the necessity for better construction in this particular, which is having its effect on some of the recent locomotives. The addition of graphite to the oil for the lubrication of cylinders is reported as being very successful on superheater locomotives in a number of cases. Air operated fire doors in several designs are being applied to the heavier types of freight locomotives and to some of the large passenger engines. A vestibule type of cab has been designed by the Canadian Pacific and is being applied to most of the new locomotives on that road.

The overfeed or scatter type stoker is the more popular, although applications of the underfeed or Crawford design continue to be made, principally by the Pennsylvania Lines West of Pittsburgh.

Experience with stokers in comparatively large numbers on a single division or on a single road show that the cost of maintenance is low. The reports do not indicate, however, that there is any noticeable saving in coal by the use of stokers, but there is a considerable increase in the capacity of the locomotive in practically every case. Further advantage, particularly in connection with the underfeed design, is the elimination of the smoke which makes it of especial value for use on switching locomotives.

The Street stoker has received the widest application, and is now in use on 13 railroads which together have 365 stokers in regular operation and 69 on order. Reports from one of the roads using a large number of these stokers show that the maintenance is less than .5 cents a locomotive mile. In another case where there are 85 Street stokers in operation the reports show 50,000 locomotive miles for each stoker delay of any character. There are 293 Crawford underfeed stokers in use. This type is showing a satisfactory service both in reliability and cost of maintenance.

In addition to above mentioned designs there is a single stoker of the Hanna type in use on the Carolina, Clinchfield & Ohio

which has been in service for over three years. About three months ago an improved design of Hanna stoker was installed on the same road. Both machines are now operating with complete satisfaction.

Two new designs of stokers have appeared during the year, both being of the overfeed or scatter type. These are the Standard stoker which is now undergoing tests on the New York Central Lines, and the Gee stoker, which is in experimental use on the Pennsylvania. Experience with the former covering six months has led to the decision to make further experimental applications and it is now being applied to a 2-6-6-2 type locomotive.

In general the effect of the success of stokers has been a relief from the handicap of having to consider the stoking capacity of the fireman on very large locomotive units, a tendency to somewhat enlarge the size of cylinders on moderately large units and an increase in the tonnage rating of stoker locomotives due to the assurance of full steam pressure throughout the length of the run. In addition to the economies offered by improved operating conditions, a material saving in the cost of fuel has been obtained in a number of cases because of the ability to use a poorer and lower priced quality of coal with stokers.

Stokers have so far been applied almost entirely to freight locomotives, since it is here that the increased capacity is particularly desired. It is also in freight service that the fatigue of the firemen at the end of a long run is most noticeable in its effect on the capacity of the engine.

TYPICAL CONSOLIDATION LOCOMOTIVES BUILT DURING 1913.

Design No.	Weight in Pounds.				Cylinders, Diam. and Stroke, in.	Diam. Drivers, in.	Steam pressure, lb.	Tractive Effort, lb.	Grate Area, sq. ft.	Heating Surface.				Tender.		Wheelbase.	
	Truck.	Drivers.	Average per axle.	Total.						Tubes, sq. ft.	Firebox, sq. ft.	Total, sq. ft.	Superheater, sq. ft.	Coal (tons).	Water (gal.).	Driving, ft. and in.	Engine, ft. and in.
1.....	30,500	236,000	59,000	266,500	26x30	57	185	55,900	66.75	3,293.4	223.7	3,517.1	774	15	9,000	17-0	27-0
2.....	25,500	230,500	57,625	256,000	25x30	57	185	51,750	99.85	2,072.1	256.6	3,098.2	622.5	14	9,000	17-0	26-1
3.....	30,000	224,000	56,000	254,000	26x30	56	175	53,900	62.5	1,986	198.2	3,026.6	695.7	17	9,000	17-0	26-10
4.....	24,940	186,060	46,513	211,000	24x30	61	180	43,000	53.4	2,185	178.0	2,392.0	522	12	7,300	17-0	26-0

FEW COMPOUNDS BUILT.

Except on articulated types of locomotives, there appears no inclination to use compound cylinders. A very noticeable exception to this general opinion is found on the Atchison, Topeka & Santa Fe, where balanced compound Pacific type passenger locomotives continue to be built. This company has had a long and extensive experience with balanced compound locomotives of the Atlantic, Prairie, and Pacific types for passenger service, the earlier ones being with saturated steam and the later additions of the Pacific type having superheaters.

PENNSYLVANIA ATLANTIC TYPE.

Because of its exceptional facilities for obtaining accurate information on the effect of the various detail features of design, and a broad-minded policy of the management in respect to the activities of the motive power department, it is not surprising that it is on the Pennsylvania Railroad that the greatest progress and most advanced position in locomotive design is found. This is well illustrated by the design of Atlantic type locomotive that has been perfected by this company during the past year.

This locomotive, on one district of the road which includes a very heavy grade, is pulling trains containing six all-steel passenger coaches, while a powerful Pacific type that has a total weight of 60,000 lbs. more than the Atlantic is able to handle but five cars on the same schedule. Furthermore, the same class of locomotive is successfully pulling trains of thirteen steel cars weighing up to 984 tons, between Manhattan Transfer, N. J., and Philadelphia, Pa., on schedules which require a sustained speed of 60 miles an hour for long distances.

No one feature of the design can be held as being principally responsible for this remarkably successful service. Boiler capacity, of course, is the absolutely essential feature for sustained power at high speeds, and these engines exceed all previous attempts for a two coupled locomotive in this respect. The powerful boiler necessarily means heavy weight, and here again have the records been broken. The weight on each of the drivers approximates 67,000 lbs., and the total weight of the locomotive is 240,000 lbs.

This apparently excessive weight on drivers is permitted because the dynamic augment due to the counterbalance at a speed of 70 miles an hour is less than 30 per cent. of the static weight on drivers. As a result these locomotives do not deliver as heavy a blow on the rail nor do they have as bad an effect on the track, so far as strain is concerned, as the majority of passenger locomotives which have a weight on drivers from 10,000 to 12,000 lbs. less per axle.

This result has been obtained only by the utmost care in the design of the reciprocating parts to obtain the minimum weight with the great strength required by the amount of power that is transmitted by a 23½-in. diameter cylinder with 205-lb. steam pressure. What has been accomplished in this respect is probably best illustrated by a statement of the weights of the various reciprocating parts of this locomotive. The 23½-in. diameter piston with piston rod key and shoe complete weighs 408½ lbs. The crosshead and wrist pin complete weigh 312 lbs., and the crosshead end of the main rod weighs 279½ lbs. This gives a total of 1,000 lbs. weight of reciprocating parts on each side of the locomotive. The same care and refinement was also given to the valve and gear and the main valve, which is a hollow inside admission 12 in. piston type, weighs but 119 lbs. The valve stem crosshead and pin weigh but 43½ lbs., and the lap and lead lever 39½ lbs.

Success in the effort to obtain the minimum weight of these parts is due to two things. First, the most careful analysis of the stresses and a determination of the best form of construction to properly transmit them. Second, the use of the very best quality of heat treated steel where it possessed any advantage. The piston heads are drop forgings and are Z shape in section. The piston rods are hollow and are of the very best quality of material, heat treated. The main and side rods are also heat treated steel, and the steel casting forming the crosshead is remarkably small and light.

After the very low percentage of dynamic effect of the counterbalance, probably the next most important feature of the design and one which is unique for this type of locomotive is the method of equalization, whereby the four-wheeled front engine truck is equalized with the front pair of drivers and the back pair of drivers are equalized with the trailer truck only. It is believed that this is the first instance of equalizing an Atlantic type locomotive in this manner and the result has been highly satisfactory.

The design of the boiler is as interesting as the other features and is based on the principles that have been developed by the work on the locomotive testing plant. No attempt can be made here to give a full description of the boiler, and it is sufficient to state that it is of the Belpaire type which is standard on the Pennsylvania, has an outside diameter of 78½ in. at the front

end and 2-in. flues 15 ft. in length. The grate area is slightly in excess of 55 sq. ft., and a 36-unit Schmidt design superheater has been applied.

The advantages of the screw reverse gear are indicated by the fact that it has been used on this locomotive where the weight of the valve gear and parts is very light and it is not actually required on that account.

Some of the general dimensions of the class of locomotives of this type now being built are as follows:

Tractive effort	29,427 lb.
Total weight	240,000 lb.
Weight on drivers	133,100 lb.
Weight on leading truck	55,000 lb.
Weight on trailing truck	51,900 lb.
Weight of engine and tender in working order	398,000 lb.
Wheel base, driving	7 ft. 5 in.
Wheel base, total	29 ft. 7½ in.
Wheel base, engine and tender	63 ft. 10½ in.
Diameter of driving wheels	80 in.
Diameter engine truck wheels	36 in.
Diameter tender truck wheels	
Cylinders, diam. and stroke	23½ x 26 in.
Diameter piston valve	12 in.
Valve travel	7 in.
Steam lap	1 5/16 in.
Lead	
Steam pressure	205 lb.
Outside diameter, front ring of boiler	78½ in.
Firebox, length and width	72 in. x 110¼ in.
Tubes, number and outside diam	242—2 in.
Flues, number and outside diam	36—5⅜ in.
Tubes and flues, length	180 in.
Heating surface, tubes	2,660.5 sq. ft.
Heating surface, firebox	195.7 sq. ft.
Superheater heating surface	721 sq. ft.
Heating surface, total	2,856.2 sq. ft.
Grate area	55.13 sq. ft.
Tender, water capacity	7,000 gal.
Tender, coal capacity	13 tons

POWERFUL CONSOLIDATION.

Another interesting locomotive design which typifies the present progress is a consolidation type for the Wheeling & Lake Erie, designed and built by the American Locomotive Company. This design illustrates what can be accomplished with some of the older types of locomotives. It was only about a year ago that the general opinion prevailed that the consolidation type was at the point of becoming obsolete for new locomotives, and that the Mikado would entirely replace it. There were good grounds for this impression for, with the exception of the Pennsylvania, no road had made any important improvement in this type for over ten years. This locomotive, however, proves the fallacy of the conclusion, and within the speed limits of a 57-in. diameter driver it has distinct advantages over a Mikado type. It delivers a pound of maximum tractive effort for each 4.77 lbs. total weight of locomotive, and gives one square foot of equivalent heating surface for each 57 lbs. total weight of locomotive. It was fully illustrated in the December issue of the *Railway Age Gazette, Mechanical Edition,* page 641.

In this connection it is interesting to note that the consolidation type locomotive is being more generally used in all sizes than was the case a couple of years ago. In the present year the total orders for this type exceeded 700, while the orders for Mikado locomotives were somewhat less. There were about 435 locomotives of the 2-8-0 type ordered by the Pennsylvania alone during the year.

ASSISTANCE OF THE SUPPLY COMPANIES.

Credit should be given to various railway supply companies, locomotive builders and other auxiliary activities for developing original improvements and the energy put forth in co-operation with the railway companies in bringing locomotives to the highest state of efficiency. Many of the most important and valuable appliances which are now in universal use, would beyond doubt, have languished for many years had it not been for the interest and energy of supply companies in rapidly developing them to a state of perfection. The superheater, brick arch and stoker are prominent examples. Under the present organization of the motive power departments on many railroads, there is little opportunity for initiative or experiments, and the work of the locomotive builders and supply companies has been of very great importance and value in bringing the American locomotive to its present position.

PASSENGER CONDITIONS AND THEIR RELATION TO THE PUBLIC.*

By George W. Boyd,
Passenger Traffic Manager, Pennsylvania Railroad.

The business of transporting passengers by railroad is scarcely 80 years old. The primitive methods of making rates, as well as of handling the passengers, were inherited by the railroads from the stage coach and the canal boat, and it is by no means improbable that the crudity of such a system, coupled with the common prejudice of the people against the newly found means of locomotion, produced the first feeling of antipathy on the part of the public against railroad management.

For nearly 50 years what may be termed the creative period of railroad history continued, and during that period the administration of passenger matters, in the absence of system and the lack of concerted action, was in a chaotic condition. The construction of new lines and the extension of those in existence made competition rampant. The struggle for traffic brought out a multitude of abuses in the devious practices resorted to for the control of traffic. The commission system bloomed and flourished, the scalper became an active force for evil, and rate wars budded and broke out over night. The passenger man's lot was not a happy one. He was a public enemy unless he yielded to popular clamor. He had to keep a sleepless eye on his competitors to protect his traffic and present a brave front to his own executive superiors, who in those days had scant sympathy with the passenger movement and rather considered the passenger department in the nature of a disordered appendix.

To continue this savage strife was fatal to all hope of profit, destructive of business integrity and inimical to the rights of shareholders. A great light broke upon the passenger situation, and a finer feeling of fair dealing and honest practices was born. The payment of commissions to agents for the control of traffic was discontinued and gradually eliminated from the situation. The law was invoked to drive the scalper from the field, and the fight against this pernicious enemy of honest dealing was relentlessly waged and won in state after state until he was practically driven from the field.

A surer and more equitable basis of rate-making and a firmer stand in their maintenance followed these reforms as a natural result. Intercourse between passenger men became more candid and sincere, a higher standard of integrity became the ruling spirit in passenger affairs, and the administration of passenger business in all its complex details assumed a place in railroad affairs which not only increased the earning power of passenger transportation, but elevated the passenger branch of the traffic department in importance, dignity and influence.

As we look back now on the record of passenger history in the last 25 years it seems clear that the leaders of the reform movement in the conduct of passenger business were unconscious forecasters of coming events. They were wisely strengthening their lines and concentrating their forces in preparation for the new conditions which national and state legislation was bound to force upon them.

It counted for nothing that during years of honest and continuing endeavor the passenger officials had striven to so regulate their business as to give the public, without favor or preference, the benefits and advantages of equitable and fair rates and superior passenger service. That old and lingering prejudice against railroad interests had waxed stronger in the public mind and reached a point of such intense and widespread hostility as to demand of the national lawmakers restrictive and regulative legislation against the railroads. This widespread sentiment took shape and form in the first interstate commerce act, creating the Interstate Commerce Commission, which undertook to regulate the conduct of all railroad business in its relations to the public. On account of the conservative measures which had

*Abstract of an address before the American Association of General Passenger and Ticket Agents at Philadelphia, October 14, 1913.

been put in practice in the 10 years preceding the enactment of this law, the majority of the railroads were prepared to adopt its provisions without serious interference to their revenues. The abolition of passes, in fact, tended to increase earnings, and the anti-discriminatory features of the bill served to still further strengthen the integrity of the rate situation and uphold the policy of a fair deal to all the people. The significant fact that very few prosecutions have been instituted for the infraction of the national laws against passenger traffic officials is ample proof that passenger men are law-abiding citizens and ever ready and anxious to perform the obligations of the railroad to the public to the fullest extent.

The Interstate Commerce Commission has practically taken over the rate-making duty of the railroads. Its powers in this respect are more than regulative—they are mandatory. Interstate rates are required to be fixed on certain principles prescribed by the law, and the commission is constantly on the alert to see that the requirements of the law are strictly observed. Rate making, therefore, has its legal status. It cannot be juggled to the advantage of one line over another. The will of the people, as expressed through their representatives, is paramount. The people have tied up the transportation lines, and force them to sell their product at a price that the purchaser determines. It is an anomalous situation. Ordinarily, the law of supply and demand fixes the price of a commodity, but railroad transportation is sold to the people at what they think the price should be without regard to the cost of production. The glaring inconsistency and manifest unfairness in this situation places the transportation lines at the enormous disadvantage of having the price of their product definitely fixed by an overruling power without the aid or authority from this power to regulate or control the expense of producing it. The law says you shall not charge any more than a fixed maximum rate for transporting passengers, but it does nothing to help you in fixing a reasonable scale of wages for the workmen required to perform the service you must render to the public. As far as the established rate regulation is concerned, it is, therefore, a one-sided affair, with all the odds against the railroads.

There can be no question of the wisdom of a governmental regulation of passenger rates under wise and well-considered legislation. It undoubtedly helps the railroads to escape those abuses against which they fought for so many years before the law took an active hand in the matter. But the public, for whose benefit all the regulative legislation is designed, fail to appreciate that they have the railroads backed into a corner, hemmed in on the front by the law and on the flanks by the insistent and extravagant demands of labor.

It should be remembered that national legislation is not the only restrictive force that confronts the railroads in their operation. Every law-making body in the country, from the tiny borough council to the halls of Congress, is active in the general movement. Every ruling or enactment of each one of these bodies in respect to the railroads affects the earning power of the railroad by increasing its expenses. Uncomputed millions of dollars within the last decade have been added to the cost of performing transportation by the innumerable laws imposed upon the railroads by the people.

All these multiplied forms of added expense have a direct bearing on the capacity of the roads for performing adequate passenger service. It follows as a natural consequence that, if passenger operation cannot be counted on to supply its proper proportion of revenue on account of the low rates enforced, the high standard of passenger service must be lowered. This would prove a most unfortunate hindrance to railroad progress. For 30 years, even during the period of rate instability, there has been a gradual but uninterrupted improvement in equipment and in the essential features of the passenger service in general. In response to the public demand, high grade trains, with accommodations not dreamed of a generation ago, have been introduced, multiplied and maintained in the highest state of efficiency. Years ago the appointments and speed of American trains compelled the admiration of the world. At the present time they have reached the climax of superiority. All-steel cars of every class provide not only every requisite of comfort and convenience, but insure the maximum of comfort and safety. The modern locomotive, with its enormous power and possibilities of speed, makes regularity of movement the rule instead of the exception. Terminal stations, notable in architecture, lavish in spaciousness, convenient in accessibility, stand as convincing proof of the purpose of the railroads to give the public the perfection of service in every detail.

The transportation of person and property by railroad is the greatest business in the world. It touches more points of human activity than any other organized business. Its intimate relations with trade, commerce, the household, society in general, and the government make it the one indispensable factor of modern existence. With this vast multiplicity of connections with the vital affairs of life, it is necessary that its administraton should demand the keenest tact and the wisest judgment. The record of passenger transportation proves that such characteristics are conspicuous in the administration of passenger affairs on our American railroads. The passenger officials of our railroads, as evidenced by the membership of this body, are able, broad and high-minded men, specialists in their profession by education and experience. Keenly alive to the responsibilities imposed upon them by the ethics of business and the requirements of the law, they are fully competent to serve their corporate masters with loyalty and the public with equity and justice. No passenger man wishes or tries to deprive the public of any of its rights. On the contrary, his aim is to interpret the law under which he works as liberally as possible, so that the people may enjoy the benefit of every advantage modern railway management can provide for them.

If the public could be convinced that the railroads are striving to give the service it demands, as far as possible within the law and under the burden of expense imposed by the law, it can hardly be doubted that sentiment in this regard would become more favorable to the corporate interests of the country. The American people in the end are always fair, and if they can be brought to realize that railroad management is honestly endeavoring to fulfil its obligations to the law of the land, and at the same time serve the best interests of the people, who are primarily responsible for the laws, they will be less eager for lower passenger fares when demanding improved passenger service. Thousands of these people are investors in railroad securities, and the promptings of their own self-interest must sooner or later influence them to give the railroads a square deal.

I feel assured that this association is of one mind in its desire to enlighten the public to a proper realization of its responsibility in these matters. Railroads cannot go on forever paying dividends if their earning power, already weakened by low rates, is to be still further eaten into by high wages, high taxes and the numberless other expenses that a compliance with the existing laws entails.

It is the plain duty of members of this body to bestir themselves jointly and individually, to use their best endeavors to educate the public mind to the importance of popular support and encouragement to railroads in order that the best interests of all concerned may be conserved.

By practice and precept, by speech and by writing, they can sow in the public mind the seeds of a better feeling toward railroad management. By a rigid adherence to the legally authorized rates they can prove to the public that everybody dealing with the railroads is on the same footing, and that no advantage is enjoyed by individual or organization.

By instilling into the minds of all employees the principles of efficiency, courtesy and consideration in all their dealings with the public they can make a long forward step toward winning and holding the confidence of the people.

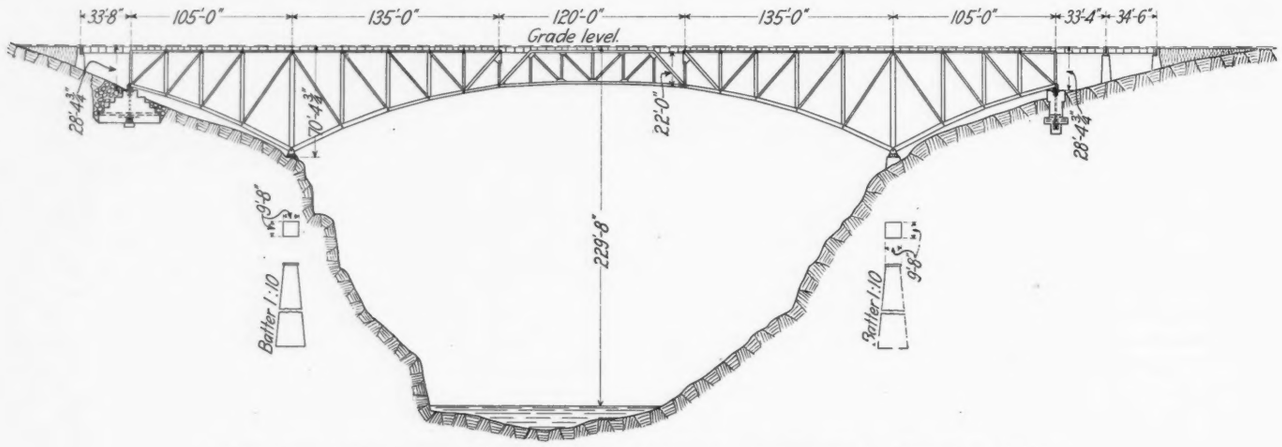
With the popular distrust of the corporate interests turned into confidence, the active support of the people will undoubtedly be given to all well-managed railroads throughout the country.

HIGH CANTILEVER BRIDGE IN MEXICO.

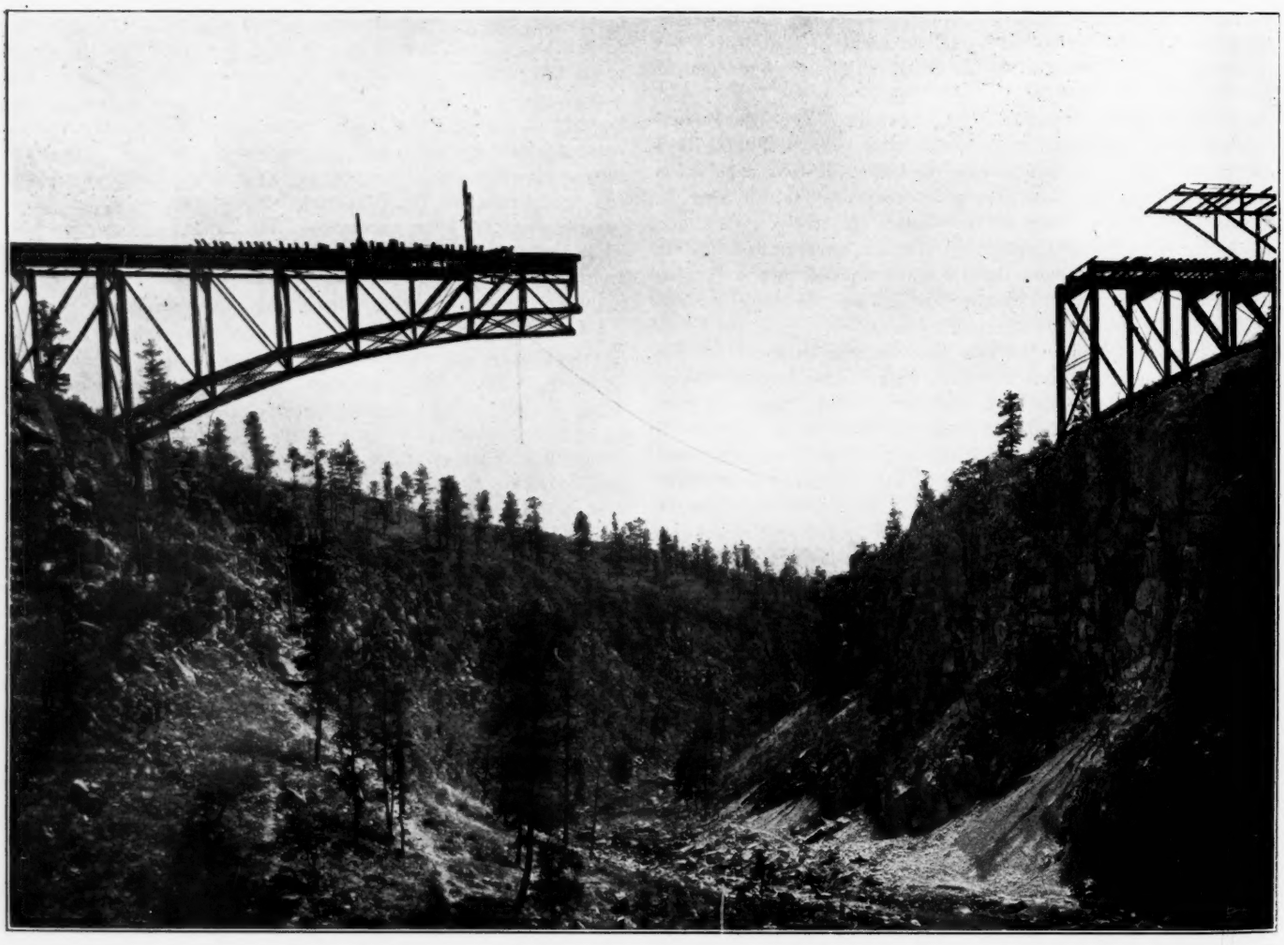
The National Railways of Mexico New Bridge Across Rio Chico. The Height of the Bridge Above the Water Is 230 ft.

The National Railways of Mexico have recently completed a high steel cantilever bridge over the Rio Chico on a new line between Durango and Llano Grande. This line is located in the state of Durango, extending about 63 miles west from the city of Durango and forming a part of the located line to the port of Mazatlan on the west coast of Mexico at about latitude 23 deg. 10 min. This extension has been built principally to develop extensive pine timber resources, but it will also serve a mining and cattle country with some agricultural development.

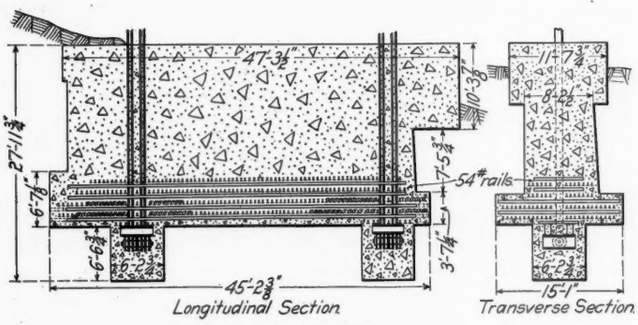
The line crosses the Rio Chico, about 20 miles west of Durango. At first it was planned to build a steel viaduct over this deep ravine, but as it was necessary to design for a loading equivalent to Cooper's E-60, the company's consulting engi-



Elevation of Cantilever Bridge Over Rio Chico on the National Railways of Mexico.



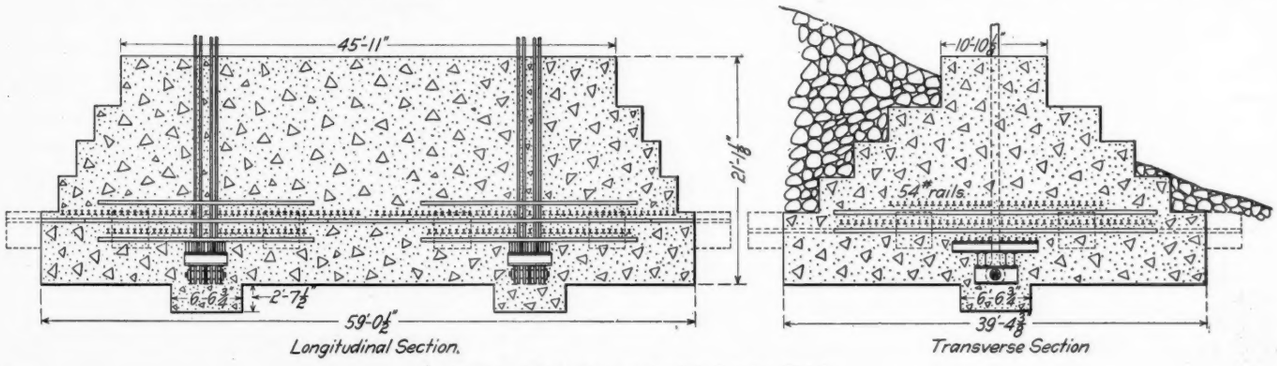
Starting the Erection of the West Half of the Structure.



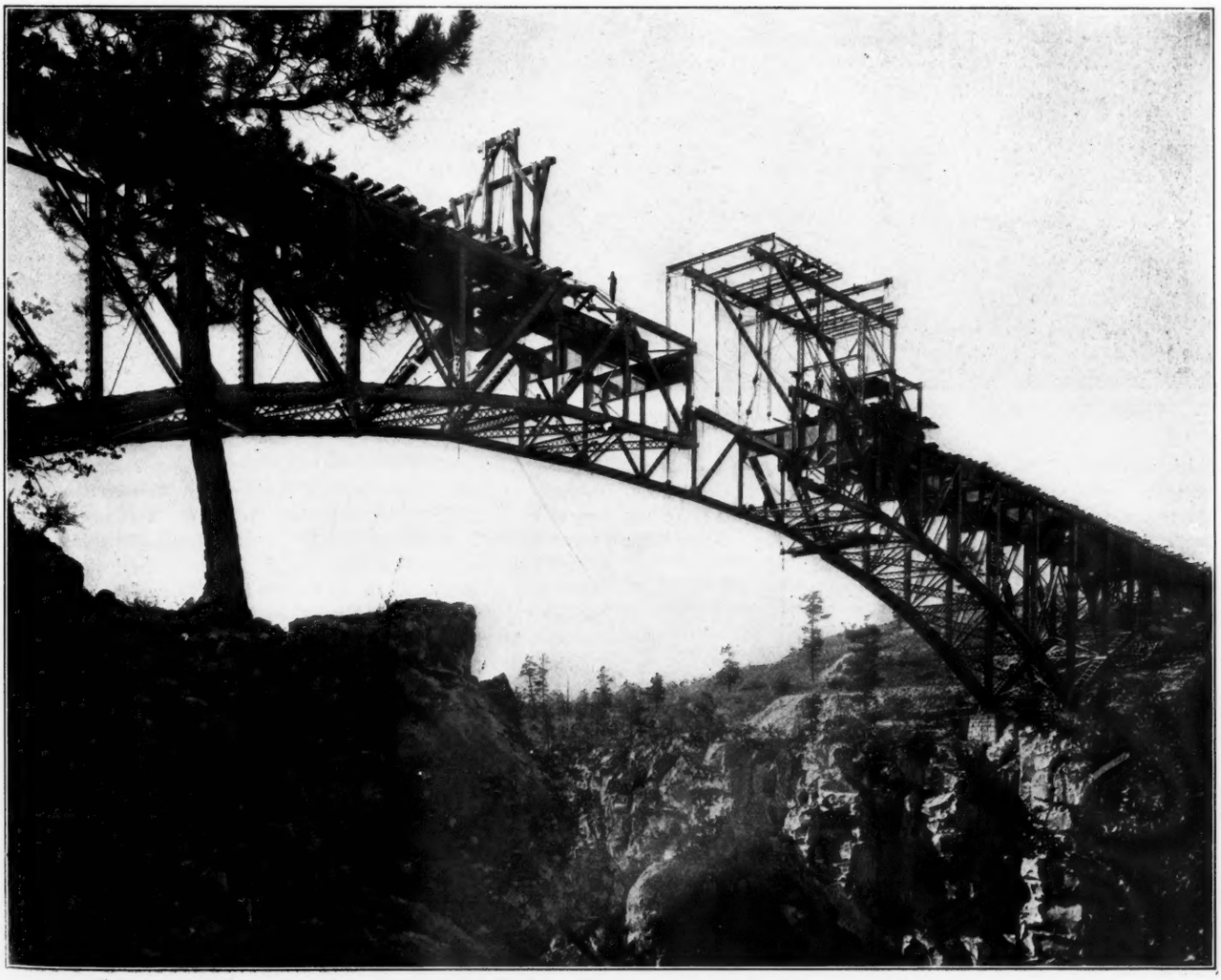
Anchor Pier in Solid Rock.

neers found that satisfactory stiffness could not be obtained in steel towers of the height required. The plan for a viaduct was therefore abandoned and a single track cantilever bridge adopted, having anchor arms of 105 ft., cantilever arms of 135 ft. and a suspended span of 120 ft. In addition to these main spans there are three deck plate girder spans 32 ft. 6 in. long in the approaches, making the total length of the bridge between back walls 701 ft. 6 in. The base of rail is 244 ft. 1 in. above the bottom of the barranca.

The anchor arms consist of four panels; two of 23 ft., one of 26 ft. 6 in., and one of 32 ft. 6 in. The spacing between trusses is 30 ft., the depth of truss at the rear anchor 28 ft. 4¾ in. from base of rail to top of masonry, and at the vertical



Anchor Pier Covered with Loose Rock.



Placing Last Section of Lower Chord.

post of the cantilever arm, 70 ft. 4¾ in. The anchors consist of concrete masses buried in the solid rock which forms the walls of the ravine. On the east side this concrete is placed in an irregular block with a collar from 2 to 3 ft. wide extending into the solid rock. Eight 10 in. x 1¾ in. "I" bars which connect the lower chord of the truss to the anchorage are carried down through grillages of 54-lb. rails to a pin supported by "I" beams on the under side of the rail grillages. The total section of these "I" bars is 140 sq. in., the safe load on which at 16,000 lbs. per sq. in., is 2,240,000 lbs. for each anchorage. The ultimate strength of the bars at 55,000 lbs. per sq. in., is 9,100,000 lbs. The weight of the east anchor is calculated as follows:

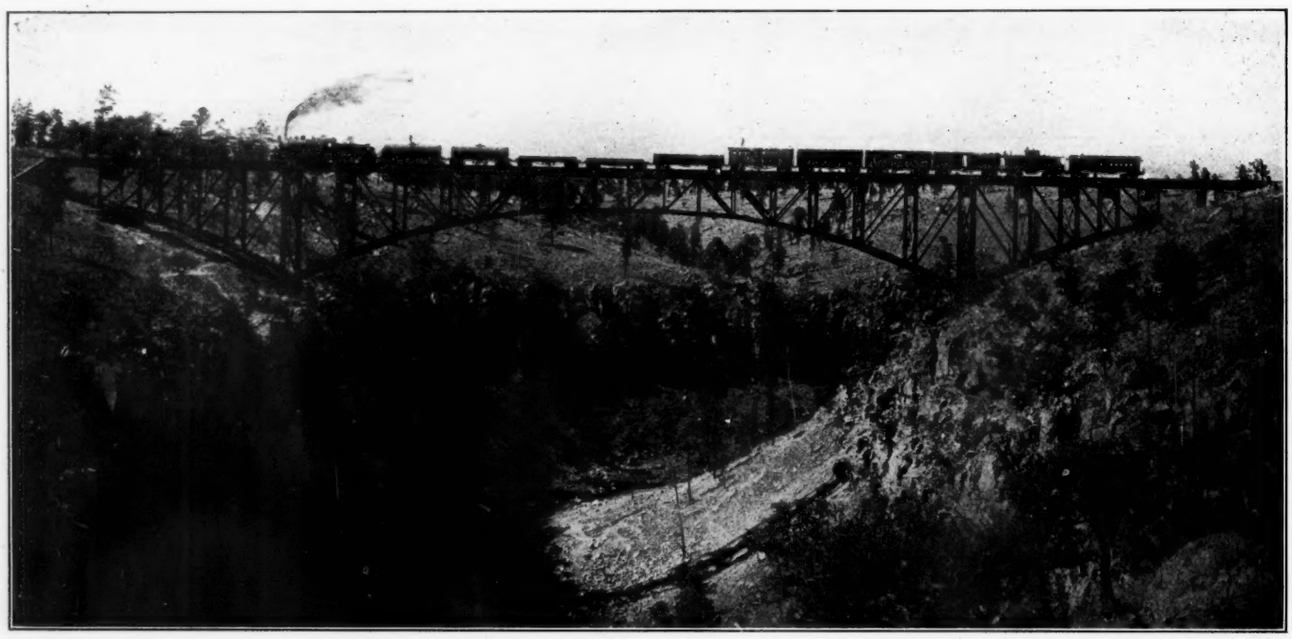
245 cu. yd. concrete	1,481,395 lbs.
1,884 lineal yd. of 54 lb. rail, including anchors.	109,031 lbs.
108.5 cu. yd. material over collar	626,832 lbs.
1,735 sq. ft. of shearing surface	7,486,500 lbs.
Total	9,703,758 lbs.

The west anchor was designed to be built in much the same manner, but in undercutting the rock to place the concrete collar the finely seamed rock sheared off and it was necessary to increase the weight. After building the large block of concrete which was stepped off, as shown in the accompanying drawing, the space above the concrete was back filled with large stone to add to the weight. The rail grillage and method of attaching the "I" bars is the same as in the anchor described above. The weight in this anchor is calculated as follows:

704 cu. yd. of concrete	4,517,763 lbs.
1,460 lineal yd. of 54 lb. rail, including anchors.	88,795 lbs.
178 cu. yd. of back fill material	822,828 lbs.
3,341 sq. ft. of shearing surface at 1,000 lb. per sq. ft.	3,341,000 lbs.
990 sq. yd. of shearing surface at 288 lb. per sq. ft.	285,200 lbs.
Total	9,055,586 lbs.

The cantilever arms consist of five panels, one 32 ft. 6 in., one 30 ft., one 26 ft. 6 in. and two 23 ft. The depth of truss varies from 63 ft. center to center of chord pins over the abutment to 22 ft. at the outer end. The cantilever and anchor arms are of the usual design for such structures, the lower chords and verticals being plate and angle sections with "I" bar members for the upper chords and diagonals. The heaviest section which is the cantilever post over the abutment, consists of two plates 36 in. x 15/16 in., and four 6 in. x 6 in. x ⅞ in. angles. The bottom chord pins at this post are 12 in. in diameter and the top chord pins 10 in. The 120 ft. suspended span is a simple Pratt truss with a 2 ft. camber in the lower chord. It has six spans of 20 ft. each.

The bridge was erected from the east end, all material being brought in at that end. The east anchor and cantilever arm were first put in place, these two sections being finished May 11, 1912. When this half had been completed, two 1¼ in. steel cables were swung from the upper main post pins of the east anchor up over a gallows frame built on the end of the erected steel to a "deadman" that was anchored in solid rock beyond the west abutment. A hoisting engine was installed on the end of the east cantilever arm and another one which was carried across on the cable was installed at the west end of the bridge, these two engines handling all the steel for the west side on this cableway. The steel was loaded on the east side with a derrick car, carried out to the gallows' frame and swung on the cables. It was picked from the cables by a traveler and swung into place. The traveler used on this work had a 50-ft. boom with 25 tons capacity on the last needle bar, and was equipped with a 30 h. p. Mundy erector's engine. The heaviest single piece placed with this traveler weighed about 30,000 lbs. Erection was started on the west anchor June 3, 1912, but had to be stopped on July 2 on account of lack of material and three months and 19 days were spent in waiting for this material. Work was resumed on October 21, and on November 22 all main connections had been riveted so that the first train could pass over the bridge. The steel was given two coats of red lead and one coat of graphite bridge paint in the field, the decking being painted two coats of mineral brown in oil after being framed.



The Completed Structure in Service.

The total weight of the bridge was a little less than 3,000,000 lbs. It was erected by force account, the detailed cost being as follows:

Steel	$69,054.70
Decking	1,923.00
Anchor reinforcement	2,336.06
Paint	1,810.75
Freight	13,069.30
Masonry, work train service and all labor charges, including supervision	62,597.21
	$150,791.02

This bridge was designed by Messrs. Boller & Hodge, consulting engineers, New York, and was erected by R. S. Cumming and O. G. Meek, resident engineers, and James Goode, foreman, under J. G. Tabler, principal engineer in charge of line.

DEMURRAGE AS A REMEDY FOR CAR SHORTAGES.*

A Plea for Higher Charges. Shippers Too Willing to Use Cars for Storage Purposes and to Send Shipments to Be Reconsigned.

By James O. Klapp,
Manager, Wisconsin Demurrage Bureau.

Demurrage and car shortages are twin troubles which have been with some of us for a long time, but are now being transferred to other shoulders for consideration and relief. Demurrage, a word coined in the twelfth century maritime laws of King William, being a charge made for boat delay, was later made to apply to car delay.

Car shortage—what is it? As commonly accepted, is it not a misnomer? From what basis shall we start to compute it? Shall it be the shippers' demand or the market's need? Shall we consider there is a car shortage when transportation companies have supplied the distributor or consumer at market with more cars than he can reconsign or unload in a reasonable time? Is it the duty of transporting companies to supply equipment as shippers may want, where the market for which it is intended is already flooded? Is there not a relation between the buyer and seller that must be considered jointly before the railroad company can be accused of dereliction in duty, and the legislatures and your respective commission bodies asked to correct an imaginary wrong? Have not the railroad companies' responsibilities been fairly and squarely met when the market's demands have been supplied with the commodity wanted? Has not the "tail wagged the dog" frequently in the past calamity calls that have been floated to the ears of the railroad officials, legislators and to your respective bodies, and have they not been so persistent that we have accepted without proper reasoning and endeavored to correct an evil that did not exist? Is not this made manifest by passing or trying to pass so-called reciprocal demurrage acts? Do such so-called reciprocal regulations control the matter? We have been experimenting for some years with such laws, but do not the so-called car shortages still exist?

Statistics show the car capacity of all railroads in the United States to have increased 69.22 per cent., and the locomotive or tractive power 109.5 per cent., with an increased business in ton-miles of only 28 per cent., in the past 10 years. Surely it cannot be maintained from these figures that the railroads have not sufficient cars or motive power, or that they have not been active in meeting the demands of commerce.

Others have assigned the failures to a lack of proper terminals. In one terminal, statistics show the average number of cars on hand for unloading during December, 1912, to have been 2,220. There were unloaded of such number 505 cars on the average daily, or but 25 per cent. During July, 1913, the average number of cars on hand was 2,127, the average unloading daily being 644, or 30 per cent. These figures do not include other cars which were on the hold tracks awaiting orders for switching or reconsigning.

May we suggest the question, to what use can increased terminals be used where patrons are not now availing themselves of the facilities already offered? Is it a presumption to suggest that increased terminals will not unload cars? That larger terminal facilities will not relieve so-called car shortages, but, to the contrary, will further aggravate them? Patrons seem determined to use the full visible yard capacity. May we suggest the question, to what use can increased terminals be put where terminals are now in excess of the room necessary successfully to handle the freight going into them, if proper diligence were exercised in the unloading or the proper storage provided by the patrons? Shall a greater overhead expense in the way of acquiring additional ground and tracks at points where land values have so phenomenally advanced, be forced upon the railroad companies solely to accommodate the storage of surplus shipments that should be unloaded and stored by patrons? In this question of increased terminals, have we not been following the same fallacious principle of the Irishman digging the fence-post hole, who, when asked what he intended to do with the dirt he was taking out, replied he intended to put it back, and when informed that all of the dirt could not be put back, promptly replied that he would dig the hole deeper?

Of grain, a very large tonnage of which is handled by the railroads each year, 90 per cent. is handled through so-called commission firms, whose principal interest in the matter is a large clientage of country or line elevators and farmers, obtaining therefrom a greater number of cars to sell, for the more cars thus obtained the larger their earnings through commissions. Have you ever considered what these commission houses or firms have in the way of their own storage for grain shipped in excess of the market's needs? In a recent hearing before a railroad commission, a grain commission man, under oath, testified that the bulk of the grain moved in a short time, that they had to find buyers after it came, which at all times was not possible to do with the free time now allowed, and that they were compelled to use the railroad companies' cars for storage purposes, as they did not have any of their own.

Another witness testified that he had to buy when the grain was on the market, that they had storage for 80,000 bushels and that their annual business outbound amounted to about 1,500,000 bushels.

While endeavoring to move grain within a short period of time, with storage limited at point of loading and unloading, would not such conditions tend to create a car shortage as based upon the shippers' demands?

We are not familiar with the handling of cotton in the South, but from various talks with those acquainted with the conditions, and from the circulars requesting co-operation in loading and unloading, issued by at least one southern railroad commission, we judge that grain and cotton contribute equally to congested terminals and varied degrees of delays to cars.

The handling of grain through a third party, or a commission house, has created laws providing for inspection either by state or regularly authorized board of trade inspectors. The tariff governing demurrage has conceded the right and allowed free time for inspection thereon. Instances have been cited of grain which moved through fifteen different markets, being subject to official inspection at each of the markets, before it was ultimately unloaded.

There was a time when the coal mines forwarded direct to the consumer as they had orders, when the consumer placed his orders as his needs demanded. In certain bituminous coal fields this practice has been very materially changed. Coal brokers now buy the output of a mine for the year, negotiate as many contracts as possible to take care of such output, depending upon their sales ability to dispose of the surplus, either by overcrowding their contracts or else by finding transient customers.

We have the word of reliable railroad officials that at one terminal as high as 5,000 cars will be on hand at one time, consigned to various brokers awaiting reconsigning instructions, due to "trade conditions," as one so aptly expresses it. Surely it must be conceded that it is not car shortage if there be fail-

*Abstract of a paper read before the National Association of Railway Commissioners, Washington, D. C., October 30, 1913.

ure to furnish other cars at the mines for the unloading of this same commodity.

Other commodities are fruit from the coast, apples from New York, melons from the South, potatoes from Wisconsin, such commodities being invariably handled through produce commission houses, who too often elect to handle direct from the car rather than put the perishable fruit into cold storage warehouses, using the car as a refrigerator and peddling therefrom as the contents are wanted, the delay to the car being measured by the market conditions.

The detention by consignee of 1,328 cars handled at one terminal in the month of December, 1912, shows an average delay of 7.71 days per car. In the month of July, 1913, on 2,096 cars handled the average detention was 6.78 days. The details of these statistics show cars on hand as high as 76 days, 45, 44 and 43 days. Would it not have been far better for these commodities not to have been shipped until the market was in need of them?

Another compelling factor in so-called shortage is the absolute failure of lake and ocean lines to provide storage for the business forwarded to them or to properly control shipments forwarded to them by rail for transshipment. The maritime laws provide for a demurrage charge where receivers delay the boat unloading. Why should not the same rule apply, on the other hand, against boat line companies where they are the unloaders?

There is still a large class of shippers, namely the manufacturers, whose manufactured or outbound product is generally handled promptly when they can obtain the cars to forward the shipments, but this class of shippers largely helps to create car shortages, the very thing of which they so seriously complain. We so commonly hear nowadays of "our large manufacturing centers." Do we stop to consider that the growth of these centers has created high land values, have we stopped to consider the shortage room for the raw material in ratio to the volume of business which they do? Is it not a fact that in the phenomenal growth of the manufacturing industries the storage room which was theirs at the time they started has been gradually reduced to supply ground for new buildings made necessary to house the machinery for the increased manufacturing? Can you conceive of any manager of one of these large houses providing his own storage where the same can be secured with as much convenience or at less cost in the railroad companies cars?

The foregoing all combine to create a congestion in the railroad yards that retards as prompt switching or handling as could otherwise take place if the excess cars on hand did not make necessary so much reswitching. Complaint of switching delay at terminals is one you often hear, and it has been a question in my mind if the findings in some instances were the result of as deep a probe as necessary to find the real fault.

Cars arriving in excess of commission or brokerage firms' ability to sell result in thousands of cars standing at different terminals. The daily orders for disposition are in small ratio to cars on hand, which necessitates the switching of thousands of cars on hold and inspection tracks that hundreds may be "dug out" and started on their way for unloading. Once started, there are encountered other cars previously ordered and on hand in excess of unloaders' facilities. A consignee with trackage facilities for 3 cars, having 50 cars on hand, with unloading appliances which will enable him to unload 15 cars a day, will demand switching adequate to his unloading appliances, and the railroad companies' difficulties compound with each additional consignee similarly prepared. The miscellaneous unloaders from team tracks, one unloading promptly, the other not, create a daily separation of empties from loads in making room for other cars wanted, more than doubling the switching work on team tracks alone, causing additional cost, for which, up to the present time, compensatory remuneration to the railroad is lacking. This condition makes for car shortage correspondingly to the delayed switching. Shall this be charged to railroad inability or neglect? Is it not at least impracticable, if not well nigh impossible, to furnish motive power and facilities that will meet the demands of the shippers under such conditions where no one is to be benefited thereby?

From the foregoing statement of fact, can it be successfully maintained that the railroads are responsible for so-called car shortages, or cannot it be more directly charged to the severed relationship between the producer and consumer, neither caring for the market's needs, and the manufacturers allowing their cars to stand under load in the outer yards awaiting their time, place and pleasure in unloading, thus shifting the responsibility of storage of the surplus on to the railroad company, whose primary duty is in the transporting of such freight and not in the storage of it.

The question we are trying to answer is, "Can demurrage be used as a greater means for relief of car shortage?" In solving the car shortage problem, do not we also solve the delays in switching and many other kindred complaints which are so persistently submitted to your respective bodies for correction? We unequivocally assert, without fear of successful contradiction, that car demurrage is one, if not the greatest agency in correcting the question now under discussion.

The uniform code of car demurrage rules, compiled by your honorable association after many days of research and hard thought, was a great step forward, and not the least accomplished was your declaration that there should be uniformity. May we suggest that the standard of uniformity is the application of the rules, and not the rules in themselves? In all rules so universal in application ambiguity of some and impracticability of others will be discovered only after practical application.

Has a practical operation of the average rule proved true the reason for its adoption? In considering this rule, may we suggest the possibility of the committee having overlooked the factor of small delay to outbound loads creating credits for application to the debits created by the more seriously delayed inbound shipments? The practical working observed with as little prejudice as possible brings out clearly that the greatest benefactors of the average rule are the ones whose business outbound either equals or exceeds the business inbound. The inbound business will accrue credits only where the cars are not being received in excess of their facilities for handling, and under the straight demurrage plan there would be no demurrage accruing under such conditions. But upon the outbound business, such as that done by a grain elevator dependent upon car supply for loading out, the country elevators, or others of like nature, credits will be obtained upon their outbound shipments, not because of any desire to load promptly, but purely because they are equipped or because their business demands it. The country elevator was originally constructed as a matter of economy in handling the grain that is bought. This facility permits of promptly loading numerous outbound cars, obtaining credits thereon which are applied upon inbound coal or lumber that stands in the car as long a period as possible, hauling direct thereform to fill such orders as they may have or contemplate, and unloading the balance into the coal shed or lumber yard, as their credits may diminish.

As a concrete example of the workings of this rule, we call your attention to the comparative results of two large firms in the city of Milwaukee, who are now working under the average agreement.

	Number of cars.	Days delayed.	Average delay per car per day.
Under straight demurrage— March and April, 1910...	2,962	2,339	0.79
Under average agreement— March and April, 1912...	3,796	5,525	1.46

Delay under average agreement exceeds delay under straight demurrage rules 0.67 days per car per day.

Actual loss in efficiency, 2,543 car days for two months.

In the foregoing the great bulk of credits was obtained upon the outbound commodity. It was not from any desire to decrease car delay, but purely because shipments had to be made

The credits thus obtained permitted of the detention on inbound shipments up to a period of seven days without incurring any demurrage charge. We respectfully ask you to consider whether any rule that will permit of an actual loss in car efficiency of 2,543 car days in a 60-day period proves the correctness or incorrectness of the hypothesis under which the rule was promulgated.

Further corroborative of our contention, the credits obtained in January and June, 1913, upon cars outbound were 18,636 car days, compared with debits of 2,332 car days. On cars unloaded the credits were 17,541 car days, as compared with 10,053 car-day debits, the percentage of credits to debits outbound being 12.51, as compared to 57.31 on inbound.

In viewing the average agreement from another angle, at a recent hearing, a signer of the average agreement openly advocated the payment of money in lieu of the "paper credits" which he is now receiving under his average agreement. Although he admitted a responsibility to the railroads and to other shippers in the prompt releasing of cars, yet he advocated a cash remuneration for doing that which he admits is his duty.

Is not this the principle that is now being applied by the signers of the average agreement? Does not the average agreement say to him, hurry the loading or unloading of one car and you may detain another car longer? Was not demurrage created because one fellow did not do himself what he thought the other fellow should do? Shall credits be extended to one for doing that which admittedly it is his duty to do? Were the demurrage rules not intended to be "you must not" instead of "you may"?

We further ask you to consider whether, if there be any merit in a demurrage charge as penalty, the plan for the asessment of demurrage that shrinks the penalty $3,802 in the month of January, and $5,000 in June, is taking the corresponding benefit of a demurrage charge away from the question of car efficiency and thus making for car shortage.

May we suggest that what theoretically sounded right has been proven false under practical working, and does it not make for car inefficiency instead of car efficiency? Does it not directly take the car from transportation and make it a warehouse?

The other rule that we would now have you consider, and which is our final thought at this time, is the rate that is now being applied, which at the time of adoption was intended to, and did, stimulate the more prompt release of equipment that it might be put back into service for which it was originally built. Is it not a fact that a dollar of today has not the same purchasing value as 25 years ago? Does it not follow that, being of less value as a medium of exchange, it correspondingly fails of accomplishment in the way of prompt releasing of cars, and that a higher rate is now necessary to obtain the same result that the $1 charge originally did at its inception?

What can be the argument that will support a successful criticism of a higher rate of demurrage? A measure that will impress the patrons with the necessity of providing their own storage or ordering that their shipments be forwarded somewhere near to the ratio of their facilities for unloading, should not be considered by anyone as being harsh. We respectfully submit that a demurrage charge is an optional charge, not a compulsory one. It is optional whether the patron elects to load or unload the contents or pay car hire thereon. If he elects to stunt his storage facilities and store in cars, does he not do a triple harm in depriving other shippers who may want the equipment, deprive the railroad company of its rightful earnings on such equipment and create a general chaotic condition in the terminal yard with its increased cost in operation to the railroad company? Can he successfully maintain a criticism against a condition of his own making or option? Is he not entitled to pay for his own neglect, carelessness or wilfulness? Is he to be permitted to work such harm because he so elects? Can he hope forever to keep in the background his own dereliction, hoping to be protected by your respective commission bodies from a demurrage charge that will force him upon his own initiative? Is this not what he is doing now?

Again we ask what will be the effect of a higher rate of demurrage? Will not the producer forward to market as the market needs, knowing that in forwarding in excess it will be at a much greater cost for storage than he can provide himself? Will not the produce commission man unload the surplus into warehouses, cold storage of his own, or otherwise? Will not the coal broker be more careful with his contracts with the mine operator and order coal forwarded as he has need of it, instead of trying to force a market? Will not the manufacturer prepare himself with more room when the charge for storage in cars is made higher than he can provide it for himself? Will not the car demand be limited to the market's needs and car shortages cease to be a bug-bear?

If these results be obtained by your honorable bodies having granted rules that will not extend the free time and a rate commensurate to the needs, do you not settle car shortage, delays in switching and their kindred troubles by a measure that works injury, if it can be so called, only to the one who elects?

Does it not stop your honorable bodies from having each year to consider such matters and bring corresponding relief to you? Does it not rightfully correct a condition that has grown with the growth of the nation?

Surely it must follow, as the sunset follows the sunrise, that a rate sufficiently high to release equipment will have this effect.

It is not for me to name a rate necessary to accomplish the results that can be obtained. California with its $6 rate shows better results on prompt releasing of equipment than at its $3 rate. The $3 rate shows quicker released and decreased earnings as compared with its $1 rate. The $2 and $3 rate for a limited period on the Canada lines, while showing a more prompt release of cars, also shows an increase on demurrage of $244,813.35, or 66 per cent.

Does not a graduated scale of charge invite a storage in cars? If a $3 rate is good for the fourth day, why will it not have the same effect on the third day? Why differentiate in rate after a reasonable time for loading or unloading is granted? Can the increased earnings in Canada, as compared with the decreased earnings in California, be attributed to this cause? It is not increased demurrage that we solicit, but a righteous settlement of the now experienced delay to the railroad freight car. Any charge that increases the demurrage earnings correspondingly fails of the results to be obtained by corrected demurrage rules or a higher rate of demurrage.

The question of amending the present demurrage rules and their application is one which sooner or later must be taken up and settled, but cannot remain unsettled for long. So-called car shortages are with us, and car demurrage can be used as an instrument to allay the complaint.

RAILROAD CONSTRUCTION IN THE PHILIPPINES.—The construction work on the Baguio branch of the Manila railroad has progressed so far that the passenger equipment has been ordered and is expected to arrive during the latter part of 1914. The branch is to be 24 miles long. The roadway has already been completed on seven miles at each end. Sixty per cent. of all the roadbed material is already in place, and on June 30, four miles of track had been laid. The construction of bridges along the line has not progressed very rapidly, for but three of the 123 bridges have been completed. Special rack-track material which will be used for eight miles of the road, where a rack-track system will be installed, has been ordered and delivery is expected to begin soon. One second-hand rack locomotive has been delivered and will be used for construction purposes. Ultimately six rack locomotives will be used in the regular service. Three of these are expected to arrive by March and the remainder by November, 1914. There are three tunnels under construction and one is nearly completed. The construction force at present numbers 3,500.

INTERSTATE COMMERCE COMMISSION'S ANNUAL REPORT.

Succinct Summary of the Commission's Multifarious Judicial and Administrative Operations During the Past Year.

The twenty-seventh annual report of the Interstate Commerce Commission, dated December 15, was sent to Congress December 19. It opens with figures showing in part the great increase in the work of the commission which has taken place during the past year. It has become almost impossible for the commissioners to absent themselves from Washington and they are arranging to delegate more of their work to subordinates. Seven thousand six hundred informal complaints have been received during the year, 1,050 more than in the preceding year. Refund of overcharges has been authorized in 4,610 cases, an increase of 1,514 over the preceding year; total amount thus awarded $349,-167. Nearly 2,000 applications of this kind have been dismissed —twice as many as in the preceding year. Relief from the provisions of the fourth section—the long and short haul section—has been granted in 1,256 cases; of these 1,256 orders 1,057 were for temporary relief. New tariffs have been suspended in 159 cases, or 39 more than in the previous year. In 32 cases the roads withdrew the tariffs; in 41 the changes were allowed; in 32 they were allowed in part; in 42 disallowed and in 4 cases the protests were withdrawn.

Formal complaints received during the year numbered 1,023, an increase of 268 over last year; 724 cases have been decided and 139 have been dismissed. Hearings conducted during the year, 1,401; increase 247; testimony taken, 140,000 pages, or 15,000 more than the preceding year.

During the 12 months ending with November, 141,257 tariffs were filed, an increase of 32,500 over the preceding 12 months. Under the improved regulations of the commission the number of tariffs filed has steadily decreased and is now smaller than at any time since 1906.

Work in the Courts.—The commission has secured 61 indictments in the courts for criminal violations of the act to regulate commerce; 28 against carriers, 33 against shippers, etc.; prosecutions concluded 72, including 50 cases in which the defendants pleaded guilty. In the cases where the government lost, a new trial will be secured under another section of the law, or by some means. Aggregate fines imposed during the year $145,400. The prosecutions were spread over territory including 20 states. The record of the year shows fewer prosecutions and a smaller aggregate amount of fines recovered; but the value of the law is not to be measured by these figures; there is a gratifying tendency among carriers and shippers to conform to the law more carefully than ever before. False billing of freight by shippers continues, and $16,750 in fines has been recovered in this field. These offences are being vigorously prosecuted. False claims for damage are also being followed up.

The privilege of stopping freight in transit continues to be abused in many places. These cases will be followed up. Discrimination by failure to collect demurrage charges has been investigated on a number of prominent roads. There have been during the year a large number of cases in which the courts have condemned a variety of ingenious schemes for rebating. These are set forth to the extent of a half dozen pages. Investigations of conditions on the anthracite coal roads and into the relation between rail carriers and water lines have developed the need of a number of amendments to the law; in particular, the commission wants authority to examine all correspondence files, indexes and other papers found in carriers' offices.

Sixty-one indictments have been returned in the courts during twelve months for violations of the act to regulate commerce and 72 prosecutions have been concluded; these are all described in two lists filling ten pages of the report.

The Intermountain rate cases, dealt with under the fourth section of the law, and other cases coming under this section, are discussed in the report at length, as is the action which has been taken on the Western freight classification.

The five cases decided by the Supreme Court of the United States during the past year are briefly reviewed. These are the New Orleans Board of Trade case (Louisville & Nashville), the Omaha Bridge case, the Lemon case, the New York Lighterage case, and the Kansas City Southern accounting case.

The only suits brought against the commission in the Commerce Court during the year have been the Tap line cases. The Commerce Court has granted preliminary injunctions in the Pipe line cases. During the year that court has upheld seven orders of the commission, has dismissed five and has decided against the commission in five. Twelve cases are pending in the Commerce Court.

Carriers' Accounts.—The commission continues to receive the co-operation of the carriers. "There is a growing appreciation of the importance of exact and theoretically correct accounting, and there is less tendency on the part of the carriers to hold that they may adjust their accounting systems to their own situation or needs." Steps will be taken to compel delinquent carriers to comply with the requirements of the commission in the matter of charging off depreciation. While the commission in the future, as in the past, will not prescribe the forms of entries which carriers are to make in their own books, it does propose to lay down a general rule which will insure a greater degree of order and clarity in those books. New regulations have been prescribed for the accounts of carriers by water and for telephone companies. Rules for telegraph companies will soon be issued. The order prescribing the length of time that records must be kept before being destroyed will be revised at the beginning of January. Reference is made to standard rules for the settlement of freight claims which have been under discussion with committees of the Freight Claim Association. [Since the report came out the commission has approved the form of blank which was agreed upon by the Freight Claim Association for the presentation of claims.]

Statistics.—That part of the report devoted to statistics gives the aggregate of the income accounts of steam roads having receipts in excess of $10,000,000 for the year ending June 30, 1913, the figures being separated into the Eastern, the Southern and the Western districts. This table fills a page and includes returns from railroad companies operating 184,483 miles of road. Other tables are: A summary of the monthly reports of revenues and expenses of steam roads having annual receipts over $1,000,000; this covers 221,749 miles; receipts and expenses of steam roads with the receipts of over $1,000,000 for the three months ending September, 1913; and similar statements for the same quarter in the six years preceding; a table showing, for these same roads, and for the same quarters, the averages of receipts and expenses per mile of line operated; a statement of the mileage of railroad and other lines operated by the principal express companies, 1913 compared with 1912; a statement of the revenues and expenses of the principal express companies for 1913 and 1912; revenues and expenses of the Pullman Company for the three months ending September 30, 1913; and five pages of summaries of railroad accidents for the year ending June 30, 1913. Some of these accident tables go into great detail. For example, derailments due to broken arch bars are given for ten years, similar figures are given under the head of rigid trucks, irregular track, bad ties, soft track, etc.

The Division of Statistics now issues a daily bulletin, for the benefit of the press, showing earnings and expenses of railways as reported for the latest month. Reports begin to come in about the 25th day of the following month and as soon as a sufficient number are on hand to make an instructive table a bulletin is

prepared. [Similar to the tables published regularly in the *Railway Age Gazette.*] A preliminary abstract of the statistics of carriers for the year ending June 30, 1913, will be issued as soon as practicable. The commission intends to revise the forms on which the railroads make their annual reports.

Safety Appliances; Hours of Service.—In many cases cars are still run in defective condition, when minor repairs would make them safe. This is because of inefficient inspection. Former bad conditions have been somewhat remedied, but there is still room for improvement. The railroads are not working fast enough in their compliance with the order of March 13, 1911, requiring compliance with additional safety standards.

One hundred ninety-one prosecutions have been begun for violation of the safety appliance act. Of 91 counts dealt with in trials in courts, 56 were decided in favor of the government. Of 35 counts decided in favor of the roads the government has appealed in regard to 31. Penalties aggregating $56,800 were collected during the year.

Eight pages of the report are taken up with accounts of decisions by the courts on the safety appliance act, the ash pan act and the hours of service act. All sorts of minute details in the construction of the laws are here considered and, judging by the numerous appeals and the conflicts between different decisions these matters will engage the attention of the courts for a long time to come. The roads reporting on the hours of service law numbered 1,222, of which 737 reported each month that there were no cases to report. The remaining 485 carriers reported 301,743 cases in which men were on duty for longer periods than those named in the law. Careful and elaborate analyses of the facts gathered in these reports have been prepared and have been sent to the railroads; and there has been a gratifying improvement. On one road the number of cases of excess service was reduced within a period of two months from 2,024 to 84. Penalties imposed by the courts for violation of the hours of service act have varied from one cent to $250 per count, and the commission asks for a more specific law naming the penalty, or a minimum penalty.

Investigation of Accidents.—During the twelve months ending June 30, 1913, the inspectors of the commission investigated 51 collisions and 25 derailments, which caused the death of 283 persons and the injury of 1,880. The causes were of the same kind as those reported heretofore for similar accidents, and which have been discussed already. Commenting on this feature of the situation the report says:

"Either a great majority of these deplorable disasters are unavoidable, or there exists a widespread lack of intelligent and well-directed effort to minimize the mistakes of employees in the operation of trains. All of the mistakes noted are violations of simple rules, which should have been easily understood by men of sufficient intelligence to be entrusted with the operation of trains. The evidence is that in the main the rules are understood, but they are habitually violated by employees who are charged with responsibility for the safe movement of trains. The evidence also is that in many cases operating officers are cognizant of this habitual disregard of rules, and no proper steps are taken to correct the evil.

"Many operating officers seem to proceed upon the theory that their responsibility ends with the promulgation of rules. On very many railroads there is little or no system of inspection or supervision of the work of train-service employees, so far as pertains to those matters which vitally affect safety. Employees are not examined on the operating rules, except at the time of their promotion, and only the most perfunctory efforts are made to determine their fitness to perform the duties assigned to them from time to time.

"This lack of supervision and inspection with respect to matters affecting the safety of trains is unexplainable, when the careful supervision of all matters directly affecting the revenue of the roads is considered. The auditing and checking systems used for detecting the dishonesty of employees are marvels of ingenuity and careful attention to detail. . . . Fourteen accidents investigated since July 1, 1911, were caused by enginemen running by stop signals. No adequate reason can be offered for these serious lapses from duty by men who, in many cases, suffer death as a consequence. The trains involved in these lamentable disasters generally are operated by trusted employees of long experience. These facts are brought to the attention of the Congress, with the suggestion that these man failures indicate the necessity for the development and perfection of some system of automatic train control to be used in connection with existing signal systems. . . . The maximum allowable speed of trains on all roads should be established at a safe limit. Legislation should be enacted prohibiting the use of wooden cars in high speed through trains after a certain date. Reasonable time should be given the carriers for compliance with the provisions of any law of this kind. There are a great number of wooden cars now in service, and the carriers should be permitted to make use of these cars on branch lines and in local service until they can be replaced, but the law should provide that all new cars constructed after a certain date should be made entirely of steel or of steel underframe construction of approved design.

"The only purpose of investigation is to learn the true causes of accidents so that such causes may be eliminated as fully as practicable. It is manifestly impossible for the commission fully to accomplish such purpose unless empowered by law to enforce its recommendations. Furthermore, the commission should be authorized to conduct independent investigations with respect to all matters affecting the safety of railway travel, the object being to prevent accidents as far as possible, rather than, as at present, merely to point out the causes of accidents after their occurrence. There is particular need for an investigation of steel rails and car wheels. . . ."

Miscellaneous.—The report next takes up the inspection of locomotive boilers, which subject is dealt with elsewhere in this issue.

The commission has given notice that applications by railroads for extension of time under the Panama Canal act, in the matter of maintaining ownership of water lines which may compete for traffic, must be presented to the commission not later than March 1, next.

The report tells what the commission has done to carry out the act of March 1, 1913, requiring it to make a valuation of the property of all common carriers. An organization has been established, but the number of applicants for places, under the Civil Service Commission rules, was so large that the preparation of rolls has been much delayed. The roll of engineers of the higher grades, for which there were 6,000 applicants, was not available until October 23, and the junior roll was not ready until November 20. To compile the statistical history of the railroads many trained accountants will be required, in addition to those already employed by the commission. Land appraisers and telephone and telegraph engineers are yet to be dealt with, the examinations being only recently completed. For the higher grades careful examination had to be made, not only on the basis of data presented by applicants, but also to learn the standing of the candidates in their home localities and their records with past employers. It is expected that actual operations in valuation will be begun early in January. In each grand geographical division a railroad will be selected which can be valued in an experimental way. Railroads of different classes will be chosen. After a few months of experimental work it is expected that good progress can be made.

The report tells what the commission has done under the parcel post law, which requires it to advise the postmaster general and approve changes made by him. The commission desires to be relieved from the duty of determining the extent to which the parcel post ought to supersede the express system and, in fact, to be relieved of all duties in connection with the parcel post.

Recommendations.—Among the recommendations for new legislation not already mentioned are the following:

That one period, three years, be fixed for the beginning of all legal actions relating to transportation charges. Difference in

statutes of limitation produce injustice. A carrier which fails to demand payment of charges for transportation within ninety days should be deemed guilty of giving a rebate to the shipper. All suits brought to enforce or set aside orders of the commission should be directly under the supervision of the commission, instead of as now, under the Department of Justice. At present much work is duplicated.

It is recommended that the commission be authorized to make orders, after investigation, respecting the construction and maintenance of the physical properties of railroads and rules and regulations pertaining to the use and operation of such properties.

That the commission be given control and supervision over railway capitalization.

That the commission be empowered "to require the use of block signal systems and to require the adoption and use of steel or steel underframe cars in passenger service."

PRELIMINARY CONSIDERATIONS IN THE DESIGN OF OPENING BRIDGES.

By Henry Grattan Tyrrell,
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The design of movable bridges is affected by the relative height of the railway grade and water, the number of movements on both thoroughfares, the depth and width of channel and the kind of shipping. A moving bridge which is well fitted for crossing a barge canal would evidently be unsuitable for a deep water course.

RESTRICTIONS ON OPENING BRIDGE CONSTRUCTION.

Low level structures with opening spans are prohibited by law on some of the largest and busiest water courses, such as the lower Mississippi and the Ohio, where it is required that sufficient underclearance be provided for the free passage at all times of all kinds of river craft. As the size of these large rivers diminishes towards their source with a proportionate diminution or total cessation of shipping, low level bridges either fixed or with a moving span are permissible. This condition is illustrated on the upper Mississippi, which has many bridges with spans arranged to float or swing.

Many of the busiest waterways in America are the river mouths at cities on the Great Lakes and seacoast, such as Chicago, Milwaukee, Cleveland and Boston. On the Chicago river, to avoid interruption of street travel, all bridges must remain closed between 6 and 8:30 a. m., and between 5 and 6:30 p. m. Other busy rivers in America are Newtown creek and Harlem river at New York, which have widths of 150 and 400 ft. respectively. Some of the busiest rivers in Europe, such as the Seine at Paris, have no masted ships, and as the steamers have hinged smoke stacks opening bridges are unnecessary.

In flat countries, the flow of rivers is fairly uniform, but in mountainous regions, such as Northern India, the rivers are usually subject to very sudden rise. Those draining the Himalayas begin to rise early in April, and the water continues high through the rainy season from the middle of June to the end of August, the greatest flow being in the months of July and August. The Indus river has a maximum rise of 6 ft., while the Hooghly is 36 ft. deep at low water, with a maximum current of 6 to 7 miles per hour, though the average flow is only about 4½ miles per hour. A pontoon bridge at Calcutta has its floor 15 ft. above the water, high enough to permit small boats to pass under without opening the draw.

The canal system of France is probably the most elaborate one on the globe, for there are no less than 3,000 miles of navigable inland waterway under state control. Some of them are very narrow, such as the Burgundy canal at Dijon, which is only 20 ft., while others are wider, as the Ourcq at Paris, which is 30 meters. Most of the canals in Venice do not exceed 15 to 25 ft. in width.

The Erie canal, through New York state, has a normal width of 60 ft., which is too narrow for swing bridges with center piers. The Miami and Erie canal in Ohio has a normal width of 50 ft., sufficient for three boats, each 15 ft. wide, but at the crossings, the openings are frequently reduced to 32 ft., leaving only enough space for two boats to pass. The usual width of freight boats on the Great Lakes of America is 50 to 52 ft. for the largest ones, with an extreme width of 56 ft. for propellers and 75 ft. for side wheel boats, the length varying from 400 to 500 ft. Barge canals in America use smaller boats, 15 ft. being the standard width on the Miami and Erie system, as noted above.

VARIABLES IN DESIGN OF OPENING BRIDGES.

When the water course is wide enough for a center pier, two channels are frequently more convenient than a single one, as travel in the two directions is then divided. This is illustrated by the bridge over the Harlem river at New York, where two openings of 100 ft. are provided, with a space of 50 to 100 ft. between them, in preference to one opening of 200 ft. The channel width of 400 ft. is crossed by swing bridges 300 ft. long, leaving a clear channel of 50 ft. on each side for boats. Dock space should not be obstructed more than necessary, for it is frequently worth $200 or more per front foot.

The required length of opening over navigable water courses in the United States is regulated by law. Previous to 1870, two clear openings of at least 160 ft. were required on the Mississippi, Missouri and Ohio rivers, resulting in swing spans about 360 ft. long; but in 1873 a new law was enacted increasing the length of clear openings to 200 ft. Under this new law, the usual length of swing spans is 440 ft. to 450 ft., depending on the width of bridge and center pier. On the Chicago river a clear bridge opening of 100 ft. is required on the north branch, and 140 ft. on the south branch and main stem, though the old Clark street swing, with a center pier, gives two clear openings of only 67 ft., which are now the narrowest on the river. In 1908, a commission appointed to report on the matter recommended clear openings of 200 ft. on the south branch, but this recommendation has not yet been put into effect. The Harlem river at New York requires two openings of 100 ft., while the Gowanus canal in Brooklyn has only one opening of 50 ft.

In Rotterdam and Amsterdam, Holland, the length of opening spans is usually less than half the canal width, the remaining part being crossed by an approach span at each side with a clear waterway underneath. Those designs in which the side spans do not obstruct the water flow are usually preferable to others where the abutments or tail-pits cut off the channels.

Any increase in clearance under the bridge usually tends to decrease the number of bridge openings, for when high enough above the water, many small boats can pass under. Water courses for barges only, such as the Erie canal in New York state, and the Miami and Erie in Ohio, require a headroom above water not exceeding 9 to 12 ft., and where this height is obtainable with a fixed span, a movable one is not needed. In flat countries with land and water at nearly the same level, it is more difficult to gain the needed under-clearance. The center clearance under bridges on the Chicago river is 16½ ft., which is reduced towards the side by the arch outline of the bottom chords. It was proposed in 1908 to increase the clearance by using horizontal bottom chords on all opening bridges. At Harlem river and Newtown creek, New York, the clearance is 24 ft., and over the Charles river at Boston it is 23 ft., while the corresponding under-clearance is 29½ ft. at the Tower bridge in London.

The number of bridge openings over a water course may not be proportional to the volume of shipping, but will depend largely upon the under-clearance. This should be great enough that small boats can pass, and as much higher as the resulting saving of time will pay interest on the extra cost of building at

higher level. These matters are subject to computation, and the proper height can be quite closely determined. Bridges should never be so low that a small boat or tug would have the power to obstruct or delay whole trains of passengers during the time of heavy travel. The old Point street swing of 1874 at Providence was opened 100 to 175 times per day, and at certain hours was allowed to remain closed only two minutes at a time. The same method of building bridges too low was common in Holland previous to 1850, with the result that they were usually kept open for water travel, until they were finally replaced. Many other bridges with insufficient under-clearance have been replaced by higher ones requiring fewer openings.

On the Erie canal it has been found that the busiest months for shipping are September and October, when the daily average movement of boats in both directions is about a hundred.

Those bridges nearest the harbor mouth, as at Rush street, Chicago, and Broadway, Milwaukee, are usually more active than others farther inland. Bridges over channels which carry little or no shipping, such as those at Indiana Harbor, are opened only often enough to keep the parts in working order.

SUBSTITUTES FOR MOVABLE BRIDGES.

Movable bridges, which are chiefly over navigable waterways, are not desirable and should be avoided wherever possible, for they delay travel, and each one represents a possible accident. They have a greater use in America than in Europe, for the more conservative engineers of Great Britain and the Continent prefer fixed spans even at greater cost, knowing that the expense of one accident may pay the extra cost of a high level structure.

In addition to movable bridges, ferries or floating bridges at water level, high-level bridges and tunnels may be used for crossing navigable waterways. Ferries are at best a makeshift, and are excusable only when nothing better is obtainable. High level bridges and tunnels may be approached at the ends by long inclines or by elevators, the former being the usual practice.

HIGH LEVEL FIXED BRIDGES.

The choice between a high level fixed bridge and one at a lower level with an opening span may often depend more on efficiency than on first cost, for, on account of the necessity for saving time, high level bridges, which are always open for travel, are often preferred. For this reason, most of the bridges on through lines in England, such as those over the Grand Junction canal between London and Birmingham, and over the Liverpool and Leeds canal, are fixed at a high level with long approach grades of 3 to 5 per cent., though a few of them are made to swing. High level bridges are also used for crossing the Forth, Tyne and Tay rivers, and the Menai Straits. The chief use of movable bridges in Great Britain is for crossing harbor entrances or docks where masted ships enter, and where train delays may be of less importance. Fixed bridges are generally used also in the rural districts of Holland, but in so flat a country with land and water at nearly the same level, the long approaches needed for fixed spans make movable ones preferable in the cities. Twenty years ago, the city of Amsterdam had no less than 340 bridges, of which only 37 were movable. Fixed bridges are the rule also in France, with its more than 3,000 miles of inland canals.

The difference between European and American practice in the use of high and low level bridges is quite striking, for in America low bridges are rather the rule than the exception. Almost every railroad, even those carrying the heaviest passenger travel, makes frequent use of low level bridges with a moving span, and endeavors to protect travel by safety devices. In order to use a low level bridge and still avoid an opening span, it was proposed in 1826 to use sunken locks beneath the bridge over the Thames at London, and a similar plan was proposed in 1890 for the Erie canal at Rochester. These plans were not favored because the expense of construction and maintenance would be great and much delay would be caused to shipping.

A comparison between high level fixed bridges and lower ones with opening spans shows but little difference in first cost, though there is usually a saving of 10 to 15 per cent. in favor of low structures. The chief difference is the cost of approach, for a bridge with a clear underneath height of 135 ft., as that over the East river at New York, with grades of 3 to 5 per cent., would necessitate approaches at each end 4,500 ft. to 2,700 ft. in length, respectively, and if the approach should lead up from more than one direction the cost of the overland construction would be increased. The opening bridge has a yearly operating expense which is avoided in high level structures.

The cost of approaches may be reduced by placing the bridge floor high enough above water to clear all ordinary craft, with an opening span over the channel for occasional use only. In some places, however, where the amount of shipping is great, as on the East river at New York, the high level bridge with under-clearance high enough for all kinds of vessels is imperative. In most other cases, however, a lower bridge with an opening span is preferable to a fixed one, both as to cost and utility. A combination of high level bridge and swing span can sometimes be used to advantage, the deck being placed 40 to 50 ft. above water, so that all ordinary boats can go under it.

TUNNELS.

Bridges have always been more favored than tunnels, and until recent years tunnels were considered suitable only for locations where bridges were impracticable or impossible. Their chief advantage is the formation of a communication across the water that is free from interruption and open at all times for travel, thus saving much time. At Detroit, the saving of time by the use of the tunnel is 15 to 20 min. for passenger trains and three to four hours for freight trains. As compared with high level bridges, tunnels require much less land area for their approaches, and the cost of real estate is proportionately less.

The objections to tunnels are many, some of them being as follows: approaches must either be long or have a steep grade; the time consumed in passing through a tunnel is greater than crossing on the level, in proportion as the tunnel is longer than a moving bridge; they are usually insufficiently supplied with air and light; they have no advantage over a bridge in winter seasons, during the period when shipping is discontinued and bridge openings are unnecessary; tunnels are disliked by the public, and are tolerated only from necessity; their first cost is frequently 10 to 15 times that of a bridge with an opening span; they need ventilating, pumping and lighting, and have a high maintenance cost; if it becomes necessary to deepen the channel, the whole tunnel may have to be rebuilt, and during the rebuilding, all traffic is stopped, and the time required for building tunnels is much greater than for bridges of the same capacity.

The great progress made in tunnel construction during the last twenty years, due to the use of improved shields and other modern appliances, has made it possible for tunnels to compete with bridges for crossing water courses, where piers cannot be used, such as those at Sarnia, East Boston and New York. The cost of tunnels is usually much greater than that of moving spans, those through hard rock generally being the cheapest and easiest to build.

The cost of tunnels depends greatly upon the depth below the water, and the resulting length. While the greatest ships afloat, such as the *Mauretania*, have a maximum draft of only 33 ft., modern subaqueous tunnels are being placed low enough to provide a deeper waterway, those at New York and Liverpool being 40 ft. below water, while that at Detroit is 41 ft. 9 in. The Panama locks are being built to accommodate ships of 45 ft. draft. The rough approximate cost per sq. ft. of roadway for high level bridges, bascules and tunnels may be taken at $5, $10 and $20, respectively.

THE CONGESTION ON THE PRUSSIAN STATE RAILWAYS IN 1912.*

By G. Allix.

Towards the end of last year the *Journal des Transports* pointed out the critical situation existing on German railways in the autumn of 1912 which was doing such serious injury to the metal and coal industries, especially in Westphalia. At that time the figures for December were not yet known, but since then complete statistics for the year 1912 have been published and the situation, which has been taken even to the Reichstag, has given rise to various discussions, among which we may cite the article from an authoritative source which appeared in the *Revue Generale des Chemins de Fer* for last August. The question is interesting not only in itself, but on account of the lessons to be drawn from what has taken place in Germany.

The report for 1912 of the committee of coal operators of Westphalia contained statistical information which the central committee of coal operators of France published in its circular of October 20 last. These statements showed that in 1912 in the different regions of Germany from which coal and lignite are shipped there was a total shortage of 1,051,334 cars, of which 56,326 were for September, 344,357 for October, 391,094 for November, and 201,638 for December.

When we take into consideration the different regions served by this railway system we see that in 1912 there was a shortage of:

538,226 cars in the Ruhr;
153,480 cars in Upper Silesia;
108,970 cars in the Magdeburg-Halle-Erfurt region;
64,693 cars in Saxony;
71,675 cars in the Rhenish lignite basin;
18,008 in the Aix-la-Chapelle region.

Thus it is the region called the Ruhr which has suffered the most by far. Following is a table of shortages for the last three years. From 50,669 cars in 1910 there was an increase in 1911 to 237,256, and this number was more than doubled in 1912. The table gives these figures in detail, month by month.

Car-Shortages in the Region of the Ruhr, Based on Cars of 10 Tons Each.

	Number of cars not furnished in time.			Percentage of the demand.		
	1910.	1911.	1912.	1910. Pct.	1911. Pct.	1912. Pct.
January	...	...	9,464	....	....	1.3
February	...	179	1,565	....	0.03	0.2
March	...	195	4,618	....	0.03	0.8
April	...	402	5,226	....	0.1	0.7
May	264	2,026	1,229	0.05	0.3	0.2
June	...	80	...	....	0.01	....
July	...	1,525	679	....	0.2	0.1
August	217	7,441	3,579	0.03	1.04	0.4
September	9,368	24,904	24,092	1.4	3.5	3.1
October	17,616	121,720	177,398	2.6	15.9	19.3
November	17,524	66,204	231,777	2.7	8.8	26
December	5,680	12,580	78,599	0.9	1.8	9.2
Total for year...	50,669	237,256	538,226	0.7	2.9	5.8

It is evident how much justification there was for the apprehensions expressed during October by the selling syndicate of the Westphalian coal mines which feared that the approaching necessity for the transportation of the beet crop would aggravate a situation that had been very annoying during the first half of October. In the basin of the Ruhr alone the proportion of unfilled orders for cars, which was very slight in August, rose suddenly to 3.1 per cent. in September; then mounted to more than 19 per cent. in October, reached the enormous figure of 26 per cent. in November, and then dropped to 9.3 per cent. in December. Transportation which in normal times required from 24 to 36 hours then took eight days. There was a partial suspension of production at an increasing number of mines, which caused losses of tens of millions to the operators and was disastrous to the laborers, whose wages represent 50 per cent. of the price of the coal produced.

The *Zeitung des Vereins Deutscher Eisenbahnverwaltungen* treats the situation resulting from this crisis as follows:

"A very disquieting aspect of the freight traffic of our railroads is that shown by the trouble experienced in the months of October and November last, particularly in the Rhenish-Westphalian districts, trouble which this time has reached a condition so serious that its gravity is not as yet known. It was not merely because of the lack of cars which usually occurs to a limited extent during the autumn months when the products of mines, of industry and of agriculture require shipment all at once. This time it had to do with actual disorder and congestion of traffic in a series of stations. According to the declarations of the Prussian Minister of Railways the number of cars had increased on July 1, 1912, by 33.836, or 8 per cent. over the 450,000 cars of the preceding year. The crisis is to be ascribed less to the shortage of available cars than to the work of reconstructing stations in the West, and as yet unfinished. The railway administration was obliged to take recourse to the extreme measure of suspending for 4 days, from October 26 to 29, the receiving of cars loaded with freight from one section of the stations on the left bank of the Rhine as well as cars consigned to Belgium, Holland and France, by way of frontier stations between Herbesthal and Venlo. But these measures could be only a temporary palliative, insufficient to put an end to the congestion of the system which continued and reached its height in the middle of November. At the same time mining and industrial corporations and chambers of commerce in all sections gave voice to the liveliest complaints in the press and even in the Reichstag.

"It became necessary, as a result of these disordered conditions, to close certain coal mines and to suspend operations in certain manufacturing works more or less completely. The principal cause of all the trouble has been the extraordinary and unforeseen development of traffic in the districts concerned. A 7 per cent. increase of traffic had been counted on, but the increase reached an average of 17 per cent. in the coal mining centers, and in some places was 28 and 30 per cent."

All the coal-producing regions of western Germany have suffered for lack of rolling stock, but not all in the same degree. The district of the Sarre, which like the railways, is controlled directly by the state, has been the most favored. This is perhaps a mere coincidence, but it is unfortunate; the administration, like Cæsar's wife, should be above suspicion.

The question of the causes of the crisis and the means of preventing its recurrence were discussed in the Prussian parliament in November and December, 1912, and gave rise to statements by Minister of Railways von Breitenbach. In January, 1913, in the Reichstag, Mr. Wackerzapp, president of the Imperial Railway Office, replied to the interrogation of the Social Democratic party. According to these authorities the disturbances which have been so strongly felt are due particularly to the lack of facilities of certain freight stations and to the extraordinary development of the traffic, which passed beyond all expectation. Estimates had always been too high from 1907 to 1909, but from 1910 they were too low. In 1910 and 1911 increases of 5.7 per cent. and 2.1 per cent. respectively had been counted on, but the actual increases were 6.5 per cent. and 4.8 per cent. For 1912 the calculations made, as Mr. Wackerzapp remarked, with the assistance of the representatives of the industries, estimated the increase at 7.5 per cent., but the actual increase was almost three times that estimate.

In 1906 a plan was formulated for construction to be carried on during a period of ten years, at a cost of $579,144,750. From 1907 to 1912, $506,625,000 was expended in betterments and in adding double, triple and quadruple tracks, a third of which were in the district of the Ruhr and its vicinity, although in this district is not more than 11 per cent. of the whole railway system of Prussia.

*In the *Journal des Transports*, November 22, 1913.

In addition to this the average annual expense for replacing and increasing the rolling stock used in operation was $26,078,000 from 1900 to 1905, and $53,075,000 in the period 1906-1913. The investment in freight car equipment averaged in the first of these periods $9,167,500, and in the second $17,563,000. The capacity of the freight cars has increased slightly, rising from 6.29 tons per axle in 1900 to 7.01 tons in 1910.

As to locomotives, increase of utilization was 33 per cent. from 1907 to 1912, increase in tractive power 76 per cent., while in the same time the ton mileage increased 41 per cent. It can not be denied that a very serious effort has been made to improve the situation, but certain critics consider it unsufficient. The Chamber of Commerce of Dusseldorf observes that the new locomotives, whose power is 7.6 per cent. greater than those of former years, have been in service only a short time and their number is not yet very large. This chamber has made up the comparative statement given below of the increase in rolling stock and of traffic on the Prussian railways during the last ten-year period.

	Locomotives.		Cars.		Traffic.	
Years.	Utilization.	Increase. Pct.	Utilization.	Increase. Pct.	Millions of tons.	Increase. Pct.
1900.....	12,871	...	284,670	...	231.0	...
1901.....	13,200	2.5	288,242	1.2	229.1	0.82
1902.....	13,720	3.9	291,016	0.9	237.9	3.86
1903.....	14,322	4.4	300,017	3.1	258.8	8.78
1904.....	14,837	3.6	310,653	3.4	269.1	3.96
1905.....	15,368	3.6	324,618	4.5	294.9	9.59
1906.....	16,184	5.2	347,410	7	318.6	8.04
1907.....	17,320	7	372,843	7.3	344.3	8.06
1908.....	18,483	6.7	392,494	5.2	333.6	3.10
1909.....	19,394	4.9	405,900	3.4	354.3	6.20
1910.....	19,886	2.5	420,728	3.6	390.5	10.23
1912.....	.....	...	450,000	6.9	.....	....
		54.5		47.8		69

The Chamber of Commerce concludes from these figures that the Administration of the Prussian state railways has placed insufficient orders for cars in previous years and that the shortage in rolling stock is thus due to its lack of foresight. But how is this? Is the boasted regularity of the German orders for equipment, so often held up as an example to the French companies who are inspired by a wise spirit of opportunism, no more than a pretence? We cannot but so believe, for the Minister of Railways has himself criticized before the Prussian Chamber the principle of the placing of regular orders. "It has been pretended," he said, "that the railway administration ought to increase its stock regularly and uniformly according to a determined percentage. It would not be wise to proceed in this way under all circumstances, for it is always well in times of economic depression not to exercise undue restraint in purchases. I realize, of course, that a railway administration ought to be equipped to cope with an estimated maximum of traffic, but when the amount of this traffic reaches the proportions which we have at present I doubt if difficulty could be avoided, for even with sufficient rolling stock it would be necessary to realize that the capacity of stations is insufficient, to say nothing of the number of employees which would have to be kept to meet all possible needs."

However that may be, it is quite evident that during the last months of 1912 on the Prussian system there was no fair adjustment of the capacity of the trackage of the system and the utilization of rolling stock to the necessities of the traffic. For the whole of the system supplied by the Car Union the supply of open cars in 1912 exceeded that of 1911 by 11.2 per cent. in April, 3.5 per cent. in May, 11.6 per cent. in June, 15 per cent. in July, 12.3 per cent. in August, 10.3 per cent. in September, 16.9 per cent. in October, 9.5 per cent. in November, and the proportionate increase was higher still in certain special districts, as in that of the Ruhr. But the insufficient station facilities and tracks impeded the movement; the congestion clogged the switching tracks; the irregularity of the movement completely deranged the schedules, disorganizing the whole service.

To prevent the recurrence of such conditions it has been decided to accelerate the provision of additional facilities and extensions on all the western part of the system and to furnish more liberal supplies. This work has been especially expedited during 1913.

It is interesting to perceive that even a country ordered and disciplined like Germany is not protected from the inconveniences that beset at times all transportation agencies. There are times when the development of traffic surpasses all estimates. The explanations given by the Prussian and the imperial governments show that no railway administration can flatter itself that it can entirely avoid crises such as those to which we have just referred.

REPORT OF CHIEF INSPECTOR OF LOCOMOTIVE BOILERS.

The annual report of the chief inspector of locomotive boilers, for the fiscal year ending June 30, 1913, shows a marked decrease in the number of casualties due to failure of locomotive boilers and their appurtenances and a substantial improvement in the condition of such equipment, when compared with the report for the preceding fiscal year. The following is taken from this report:

Knowing that it would be impossible to correct at once all defective and improper conditions existing and that improvement must come as the result of a process of evolution rather than revolution, attention was first concentrated on the more serious accidents in an effort to reduce the number of fatalities, although no minor defect that could be remedied was neglected. The result of this policy is shown by a reduction of over 60 per cent. in the number killed and 10 per cent. in the number injured by failures of locomotive boilers and their appurtenances during the fiscal year ending June 30, 1913, as compared with the preceding year.

The practice of conducting a rigid, searching investigation of all accidents sufficiently serious to justify a report, with the sole object in view of determining the exact cause and having the proper remedy applied, has done much to reduce the list of casualties. The knowledge that such an investigation will follow every accident is an incentive to the railroad companies to maintain their equipment so that its condition can not be shown to have caused accidents, and is also an incentive to the employees to perform their work in the most efficient and careful manner. Therefore, we have followed the policy of investigating every accident reported to this division. The investigation of accidents by government inspectors whose only object is to promote safety, and who are therefore impartial, has directed attention to conditions which previously have been overlooked or ignored.

The period since the law became effective has been too brief to permit a comparison to be made which will accurately show its value. It is believed, however, that the following comparison of some of the most serious as well as some of the most frequent accidents during the first and last quarters of the fiscal year ending June 30, 1913, fairly represents the benefits which result from government supervision over the condition of locomotive boilers and their appurtenances.

	Accidents during first quarter, 1913.	Accidents during last quarter, 1913.
Crown-sheet failures	18	9
Water glasses bursting	36	16
Lubricator glasses bursting	11	6
Squirt-hose failures	161	64
Flue failures	15	11

A summary of the inspection work performed during the year shows the following:

Number of locomotives inspected	90,346
Number found defective	54,522
Number out of service	4,676
Number having pressure reduced to insure proper factor of safety	472
Number having seams reinforced by welt plates to insure proper factor of safety	561
Number having the lowest reading of the waterglass raised to comply with the law	381

Number having the lowest gage cock raised to comply with the law.	172
Number strengthened by having braces of greater sectional area applied	281
Number requiring additional support of crown sheet	147

It will thus be seen that during the year 6,690 locomotives were either held out of service for repairs or ordered changed and strengthened to conform to the requirements of the law.

The number of locomotives found defective as shown above, viz., 54,522, does not indicate that this number of locomotives was found to be in violation of the law, but they were found to contain defects which should be remedied before the locomotives were again placed in service. The number found in direct violation of the law is represented by the number ordered out of service. No formal appeal from the action of any district inspector has been filed during the year. This, in view of the vast amount of work performed and the number of locomotives on which repairs were ordered, shows that while the inspectors have been diligent they have also used discretion and good judgment in the enforcement of the law. It is believed that it also shows the existence of a spirit of co-operation and an earnest effort to comply with the requirements of the law on the part of a large majority of railroad officials.

Specifications for practically all locomotive boilers in service were filed within the time prescribed by the law, but the variation in design and the widely different methods of calculation followed by the various railroads has delayed the work of checking them. Very satisfactory progress is being made in this important work, and it will soon be possible to show accurately the stresses on each part of every locomotive boiler in service. The results obtained indicate that when the checking is complete it will be necessary in some instances to compare the data shown on the specification cards with actual measurements in order to insure the accuracy of the information furnished. Specifications are filed for all new locomotive boilers before they are put in service, and when repairs are made on boilers now in service which in any way affect their strength, the changes are reported on a suitable form; therefore our records are kept up to date.

Shortly after our inspectors were placed in the field they frequently advised that they were finding locomotives in service with serious defects, such as sharp or badly worn flanges, flat wheels, cracked or broken wheels, loose wheels or tires, thin or badly worn tires, excessive lateral motion in engine trucks, drivers, and trailers, broken frames, broken arch bars, broken springs, and other defects, all of which are a fruitful source of accidents and derailments, but which are not covered by the locomotive boiler inspection law, or any other law. In fact, it was found to be a common practice on some railroads to continue in service on their own line equipment which if offered in interchange by a connecting line would be refused on account of its defective condition.

Although this division has no legal authority to act in such cases, we believe that travelers and employees on railroads are entitled to all the protection against accidents that can be provided. Therefore our inspectors were instructed while making their regular inspections to note any defective conditions on locomotives which were apt to cause accidents, and when any were found to advise the railroad official in charge, and if proper repairs were not promptly made to wire the chief inspector, who would bring it to the attention of higher officials. During the past year 1,568 locomotives having defects of the above-mentioned character, 1,052 of which were defective wheels, have been reported to this division and to the railroad officials. These defects have been discovered by such casual inspection of the different parts of the locomotives as could be made while our inspectors were engaged in their regular work of inspecting locomotive boilers and their appurtenances as required by law. There can be no doubt, therefore, that many more would have been found had a more thorough inspection been made. It is extremely gratifying to be able to state that a large percentage of the railroad officials appreciate this action on the part of our inspectors and take prompt action to remedy the defects to which their attention has been thus directed.

In some instances, however, railroad officials have objected to this division requesting repairs to defects not covered by the law, have advised us that we have no authority over such matters, and have failed to make the repairs, even though the defects were of a nature that might cause serious accidents. For this reason the provisions of section 6 of the locomotive-boiler inspection law should be made to apply to every part of locomotives and tenders, as well as to locomotive boilers and their appurtenances, so that our inspectors would have legal authority to require proper repairs to be made to any part of the locomotive or tender when it is found to be in an unsafe or improper condition for service.

It is respectfully recommended, therefore, that Congress be requested to enact necessary legislation to confer upon this division the authority to require repairs to be made to any part of a locomotive or tender when it is found to be in an unsafe or improper condition to operate in the service to which the same is put. Such an inspection would to a certain extent increase the work and responsibility of this division, but it would be a safeguard to travelers and employees upon railroads that would amply repay the effort, and as this division already has an organization of mechanical experts fully qualified to perform such work, a small increase in this force would enable us to conduct a very efficient locomotive inspection without increasing the cost beyond the maximum fixed by the locomotive-boiler inspection law.

PLAN FOR A UNIFORM FREIGHT RATE STRUCTURE AND METHOD OF STATING RATES.

W. B. Barr and E. E. Williamson, of Washington, D. C., have recently copyrighted an interesting plan for the simplification of railway freight rate tariffs by the establishment of a uniform rate structure which includes a novel method of stating rates and classifications by the use of a "Universal Freight Rate Base Sheet."

Briefly stated, the plan provides for the adoption of specific base rates between any two points, to be determined with regard to transportation and commercial conditions in various sections of the country, and the classification of rates on the various commodities as percentages above or below the base rate, the relations to be the same throughout the United States.

The Universal Freight Rate Base Sheet consists of tables of all base rates in cents per 100 pounds from 10 cents up to $3.00, arranged in vertical columns and printed in red, with the percentages of these rates, printed in black, graduated up to 300 per cent. and down to 10 per cent., in parallel columns to the left and right, respectively, of the base rate column. These tables occupy three sheets each 16½ in. by 17½ in., containing 46 columns or classes, including the base rate.

The need for a uniform rate structure and the various features of the plan are described in a statement issued by the authors in part as follows:

"In the earlier stages of railway growth, when there were many small and independent lines, rates and classifications were made by almost as many traffic men as there were roads, and without any reference to a common unit. Since the enactment of the interstate commerce law, many of the numerous classifications have been consolidated, and a standard adopted for computing rates in certain territories.

"Notwithstanding this, the marvelous growth of commerce, and the rapid expansion of railway mileage, makes necessary, under the existing system of rate structures, a multiplicity of commodity tariffs and exceptions to classifications, with such variety of expression in all of them, that it leaves the layman

in a labyrinthian maze, and even the most competent traffic expert is often at his wits' end to interpret them. The one imperative need of commerce and transportation today, is uniformity and simplicity in the statement of rates.

"Heretofore thought has almost exclusively centered around a uniform classification, with practically no serious consideration given to a uniform rate structure to which it could be applied; hence the slow progress since 1890, in the matter of a uniform classification. After a most exhaustive study of the subject our judgment is that a uniform rate structure is a condition precedent to any successful effort to construct a uniform classification. Once a uniform rate structure is determined upon, a uniform classification applicable thereto would rapidly follow.

"A freight rate structure or schedule should logically be predicated upon a unit. A freight rate structure or schedule in its simplest form consists of a base rate as a unit, and classified ratings fixed on a percentage relation thereto. Our Universal Freight Rate Base Sheet is predicated on a base rate as a unit, with percentage relations thereto, being a uniform freight rate structure or schedule in its simplest form.

"The base rate between any two points is fixed with regard to the transportation and commercial conditions of each section in which located. The classified percentage ratings in their relation to any given base rate are the same throughout the United States. Thus 75 cents per 100 pounds may be the just and reasonable base rate for 1,000 miles in Official territory, 100 miles in Southern territory, and 200 miles in Western territory. But in each instance all the other classified percentage ratings bear a uniform relation to the base rate of 75 cents.

"The adoption of the Base Sheet means that the base rate or unit is the only rate published in a tariff (except as hereinafter explained) between any two given points. Rates other than base are computed as a percentage below or above base. By making the Base Sheet a part of each tariff it is only necessary to publish the base rate between any two given points. To ascertain the rates between any two given points other than base, first find the base rate and then refer to the Base Sheet for the rate set forth under the percentage rating assigned to the article in the classification.

"The Universal Freight Rate Base Sheet provides a rate structure or schedule to which a uniform classification can be applied. It anticipates the discarding of numerals and letters, such as are used in existing classifications, and substituting therefore ratings as base, or a percentage below or above base. The Base Sheet provides 46 classified ratings including base. As the base rate only is published (except as hereinafter explained) between any two given points, it is practical to state as classified ratings as many percentage relations of base as may be necessary. This liberal number of percentage ratings results in no complications, because the situation resolves itself into a simple proposition of indexing.

"Under the different existing rate structures, the number of class rates as indicated by numerals and letters is so limited as to be inadequate to express the rates under which the bulk of commerce actually moves. Hence a confusing list of exceptions to the existing classifications and hundreds of commodity rates are found to be necessary, thus creating a complex situation that is almost unbearable.

"The 46 classified percentage ratings of the Base Sheet afford such a flexibility of expression that the number of exceptions to the classification is reduced to a minimum. Inasmuch as there are in the several existing classification territories certain articles of commerce that are peculiar to each, a minimum number of exceptions to a uniform classification framed to govern the Base Sheet will still be necessary to take care of peculiar circumstances and conditions affecting them.

"It is conservatively estimated that under the facility of expression afforded by the Universal Freight Rate Base Sheet governed by classified percentage ratings, the number of commodity rates now published can be reduced from 75 to 80 per cent., and a very large percentage of our commerce moves under a uniform classification.

"It will still be more convenient for the shipping public and the carriers, for the rates on the leading staples in commerce, among others grain, coal and coke, lumber, iron ore, pig iron, cotton and fertilizer, to be published in specific commodity tariffs, because rates thereon are usually grouped as to points of origin or points of destination or both.

"There being no uniform percentage relation between the various numeral and letter classes, under the present rate structures (except as published by the legislatures and railway commissions of a few states), much of the time of freight traffic officials and their rate staffs is taken up in an alinement of the various numeral and letter classes, whereas a great saving in this respect is afforded by the Universal Freight Rate Base Sheet, which automatically determines the percentage relation of all other classes, once the base is established between two given points.

"To illustrate: If 40 cents per 100 lbs. is fixed by the carriers as a just and reasonable base rate between two points, it is not necessary for traffic officials and their staff to spend time in the alinement of other classified rates, because 40 cents per 100 lbs. having been fixed as the base rate, the Universal Freight Rate Base Sheet, which would be a part of each tariff, indicates all the other classified rates in a percentage relation to the base rate of 40 cents.

"The first class rate from Ohio river crossings to Atlanta, Ga., is 98 cents per 100 lbs. Let us assume, for the purpose of illustration, that 98 cents is a just and reasonable base rate. Further, let us assume that the base rate from Atlanta, Ga., to some local point on the Southern Railway south of Atlanta, Ga., is 30 cents per 100 lbs. Forty per cent. of the base rate of 98 cents to Atlanta is 39 cents. Forty per cent. of the base rate of 30 cents from Atlanta is 12 cents. The sum of 39 cents and 12 cents is 51 cents. The sum of the base rate of 98 cents to Atlanta and the base rate of 30 cents from Atlanta is $1.28, or stated differently, the through base rate from Ohio river crossings to such local point on the Southern Railway south of Atlanta is $1.28.

"By referring to Sheet 2 of the Universal Freight Rate Base Sheet, it will be seen that 40 per cent. of the base rate of $1.28 is 51 cents, which equals the sum of 40 per cent. of 98 cents and 40 per cent. of 30 cents. In other words, the percentage of the sum of any two base rates is equal to the sum of the same percentage of said two base rates, the Universal Freight Rate Base Sheet acting, so to speak, as an automatic adder.

"The base rate, being the unit, must be such a rate that the schedule of classified percentage ratings predicated thereon will be just and reasonable.

"It is believed that the first-class rates under the existing rate structures will afford a guide in determining the base rates."

TRAVELING IN KASHMIR.—There is as yet no railroad to the vale of Kashmir. Travelers who wish to get there have to travel a distance of about 200 miles from a point in the Punjab on the line of the Northwestern, either by a horse vehicle, known as a tonga, or by motor car. The cost of a round trip in the latter is about $130, and the journey can be made in a day and a half, barring accidents. The traveler must pay $13 for a seat in a tonga. If he does not make stops at night he can cover the distance in 36 or 38 hours, but for ordinary travelers the journey takes at least three or four days. The tongas are very uncomfortable. They can carry no baggage to speak of; that must be sent ahead to take a 15 day journey in slow bullock carts. Needless to say the vale of Kashmir is in a position of comparative seclusion.

General News.

The Great Northern roundhouse at Maxbass, N. D., was destroyed by fire on December 15.

A new railroad Y. M. C. A. building on the Missouri Pacific at Bush, Ill., was opened on Thanksgiving day, and formally opened on December 3. The building cost $19,000, and is the thirteenth building of this character on the lines of the Missouri Pacific-Iron Mountain system.

D. O. Ives, chairman of the Transportation Committee of the Boston Chamber of Commerce, and a well known former railroad traffic officer, is recommended by the commercial organizations of the six New England states as a candidate for a place on the Interstate Commerce Commission.

Electrification of the main line of the Pennsylvania from Philadelphia westward to Paoli has now progressed to the extent that the company has completed an experimental overhead structure for a distance of one mile. It is understood that the Philadelphia-Paoli electrification will be single phase.

A bill has been passed by the upper house of Congress to provide that suits brought against a railroad or a common carrier before either a state or a federal court may not be appealed to a higher court unless the amount involved is more than $1,000. The bill was reported by the Senate Judiciary Committee and was adopted without debate.

T. J. Freeman, president of the International & Great Northern, is quoted as saying it will cost the road $225,000 to $250,000 to repair the damage caused by the recent flood. The Texas Railroad Commission has asked the roads affected by the floods to submit a detailed statement reporting the losses sustained and the damage done by the floods, with an estimate of the cost of repairs and replacements.

W. W. Ryder, for the past year at the head of the railway contract department of the Western Union Telegraph Company, has been appointed general manager of the Western division of that company with office at Chicago, succeeding T. P. Cook. Mr. Ryder was formerly and for 17 years, 1893-1910, superintendent of telegraph of the Chicago, Burlington & Quincy; and he later held a similar position on the New York Central Lines west of Buffalo.

The new shops of the Chicago & North Western at Clinton, Iowa, were formally opened on December 17. The railway management gave a reception at the shops to the public in the afternoon, and the Clinton Commercial Club gave a reception and dinner to the officers of the road in the evening. C. F. Terhune, secretary of the Club, was the toastmaster, and addresses were made by several citizens, and also by several officers of the road, including R. H. Aishton, vice-president in charge of operation. The dinner was an unusual one because of the cordial spirit of co-operation manifested by both the business men and the railway officers.

It is estimated in Chicago that the railroads are operating cars equivalent to five or six ordinary trains, with practically no remuneration, to handle the holiday tonnage of parcel post matter in and out of Chicago. The Post Office Department will have an increase for the year of about $17,000,000 in its receipts, wholly attributable to the parcel post, and almost unburdened with any expense of transportation. Figures of the Chicago Post Office show that where from 130 to 140 tons of parcel post matter have been sent out daily for months, from 200 to 250 tons have been sent in the last few days. The Chicago office will handle about ten million packages for December, it is estimated, against three million last January. On this basis the country's shipments by parcel post for Christmas will exceed fifty million packages.

The report of Second Assistant Postmaster General Stewart, issued this week, indicates that the post office department expects to reduce the increased expenditures for railway car service by establishing railway terminal post offices and requiring the mail of publishers to be separated by routes. A large amount of additional car space already has been required on mail trains to make room for the parcel post. The extension of the service caused an increase of $451,072 in the annual expenditure for car rental from January 1 to November 29. Considerable space in the report is given to a discussion of the transportation of the periodical mail by fast freight. It is asserted that this method of transportation has been generally satisfactory to publishers. On the question of additional compensation for the transportation of the mails, it is promised that a report will be made to Congress on or before March 4.

Safety-First in Earnest.

According to a Los Angeles paper, the campaign carried on by the officers of the Atchison, Topeka & Santa Fe, to promote "safety-first" and to induce employees to "Get the Safety Habit," was duly impressed on about 1,000 mechanics recently at San Bernardino, Cal., when it was announced that several men had been discharged for failure to observe the instructions to use the foot viaduct when crossing the switching yards.

Signal Instruction on the North Western.

The Chicago & North Western has established a plan of signal instruction on its lines for the benefit of operating employees. A passenger coach, especially fitted up to conform to the needs of the man in charge, is utilized for the instruction work. One-half of the car is given over to a lecture room; at the other end are the quarters of the instructor, and a dark room and other facilities for the developing of pictures and making of lantern slides.

The instructor is supplied with a combination gas-electric stereopticon machine, and an oxyhydrogen gas generator, for use at points where electric power is not obtainable. The car also is fitted with both gas and electric lighting facilities. Twice a year the signal instruction car will cover the Chicago & North Western system, disseminating the latest signal information, advice and instructions among all operating employees. Stops are made at important points on each division. At each point lectures lasting about two hours are given, illustrated by stereopticon views taken on that particular division. The various signal or interlocking devices, positions and difficulties, every piece of unusual track and other conditions not immediately understood by average employees are thus brought before the men most vitally interested, and fully explained by the lecturer. Great interest is shown in this work by the employees. Everywhere the lectures are given they are well attended. C. G. Stecher, signal instructor, is in charge of the work, and the signal instruction car. He has recently been giving lectures in the old Wells street terminal yards, Chicago.

Progress in St. Paul Electrification.

The Chicago, Milwaukee & St. Paul has decided to proceed with a part of its elaborate electrification project. It will electrify one engine district, Deer Lodge, Mont., to Three Forks crossing in the Rocky mountains; 113 miles of line. With sidings and yards there will be a total of 168 miles of track. Direct current will be used, 2,400 volts, with overhead trolley construction. Wooden poles and mast arms to be used on tangents, and span wires over curves. In yards steel poles and overhead bridge trolley supports will be used. The power will be received from the Great Falls Power Company, to be transmitted at 100,000 volts and transformed to the trolley voltage in five substations ranging in capacity from 3,000 to 4,500 kilowatts, depending on the grade of the section to be served. The locomotives are to be of the same type as those used on the Butte, Anaconda & Pacific, with modifications to meet the Milwaukee's conditions.

Brevity the Soul of Wit.

One of the officers of this company recently dictated a telegram of 296 words. An efficient and careful stenographer, with an eye to the company's interests "blue penciled" the message and succeeded in concisely but fully covering the subject in just 91, or a saving of 205 words. The telegraph wires are to be used of course. That is what the service is for, but a mere consideration of your own time, the time of the operators and of the company will force the conclusion that many of us often unconsciously

run to words. Not one telegram in ten sent over the company's wires but what could be comfortably scaled down.—*Sunset Central Bulletin.*

Courtesy in Correspondence.

We are constantly urged to be courteous to our patrons in our personal dealings. It is just as important that we be courteous in our correspondence. Every letter, regardless of its tenor, contents, or writer, is entitled to a prompt and courteous acknowledgment. It is often necessary to refer it to some other authority for information or instruction. This entails delay and sometimes is overlooked. In the meantime, the writer is in ignorance of the cause of the delay and blames the railroad. Hence, it is important that letters from patrons be promptly acknowledged if possible the day they are received. This is an almost invariable rule of business houses, certainly of the successful ones.

This leads up to correspondence among ourselves. We are prone to judge for ourselves as to the necessity for a prompt reply, overlooking the fact that the "man on the ground" is the best judge of this. It also depends too frequently on one who signs the communication. If, as should be the case, the same attention were given to a communication from the humblest employees as is given to a communication from the man "higher up," the man "higher up" would have more time to give to more important matters. We are also prone to judge for ourselves and disregard a request to "answer by wire," "phone answer," "rush answer," etc. Such requests should be complied with. Such a request is in nearly every case made in the interests of the company, either to satisfy patrons or to secure traffic, and the man "on the ground" is the best judge. Many a car of freight has been lost and many a patron alienated because an agent or other traffic representative could not get the information he asked for by the time he wanted it, and which he should have been given promptly and properly. By working together, we work as one and the company will get the result.—*Sunset Central Bulletin.*

The Traffic Club of New York.

The regular monthly meeting of the New York Traffic Club will be held at the Waldorf-Astoria, on December 30. The subject for discussion at the meeting will be Current Transportation Problems. There will be brief addresses by J. S. Marvin, general traffic manager, Automobile Chamber of Commerce; J. C. Lincoln, manager of the traffic bureau, Merchants Association of New York; Paul Gottheil, senior member of the firm of Funch, Edye & Company, steamship agents, and Nat Duke, assistant freight traffic manager of the D. L. & W. As an entertainment feature, H. C. Hooker, of the Erie Railroad, has consented to sing one or more selections. The club has also secured the Gwent Welsh male singers, with George F. Davies as conductor.

The annual dinner of the Traffic Club will be held at the Waldorf-Astoria on February 11.

A Stockholders' Association.

There have been recently various movements looking toward the formation of a stockholders' protective union or association which would, if necessary, hire counsel and protect the small stockholders' interest from hostile legislation, unfair decision of railroad commissions, etc. Dr. Thomas Dixon, of Brooklyn, has started to organize the stockholders of the Pennsylvania Railroad, and Herbert A. Scheftel introduced recently in the New York Chamber of Commerce a resolution preparing the way for the organization of a general stockholders' protective union. In an interview printed in the *Wall Street Journal* recently Mr. Scheftel is quoted in part as follows:

"I am much pleased at the interest everywhere shown in the resolution I offered at the Chamber of Commerce meeting, suggesting that stockholders be unionized to protect their holdings against constant political attack.

"Properly undertaken and conducted, such an organization would draw to itself and include in its membership all who have any property interest in the country and so counterbalance the activity which finds expression through the unionized labor organization and socialistic societies which are united against capital.

"The trend of this latter movement, starting in with a campaign against big business, has gotten down to a point where prosperity is considered a crime and anyone owning property of any kind is viewed with distrust. This is illustrated in one of the letters which I have received, in which the writer says:

"'Actually, I have come to feel that somehow, by reason of being a stockholder, I no longer have any rights as a citizen or reason to expect consideration of my interests at the hands of the lawmakers. There is certainly injustice in such a state of affairs that must ultimately react to the injury of the country in general.'

"I do not believe the average man realizes what the end of this movement, attacking capital and securities, will result in. The business of the country is founded upon capital and if the supply of this is withdrawn, business must come to a halt and the means of subsistence of a large part of our people would thus be destroyed.

"Today all new enterprises are practically at a standstill. The condition of the security market affects millions of people—not only the bond and stockholders. It goes to the bottom of society and affects a great army of poor people, who are the beneficiaries of insurance policies, for instance, because the welfare of the insurance companies depends upon the value of the securities which they hold.

"Unorganized as the stockholders are at present, they are powerless to protect themselves and their securities have become the target of socialists, yellow publications, and the politicians. But if these same stockholders and property owners were organized, the business and industrial interests of the country would lead all others and this influence would benefit every member of the community.

"A movement of a similar character was undertaken once before, when the country was threatened with a crisis. One stockholder writes me as follows of this occasion:

"'When McKinley was elected President of the United States in 1896, stockholders of railroads, banks and industrial companies were all aroused to take an active part in that campaign. They were so eloquently advised that they must do it, that they did do it. There was one result from this and that was a victory for the business interests of the country. The present situation seems to be approaching a similar crisis unless these selfsame people begin to realize their danger and take an active part in a campaign for their business rights.'

"For some years we have been living under a government of agitation. One agitation has followed another, one so-callel reform close upon another. Wild theories have been introduced, with pressure to have them tried out.

"It is certainly time for the sound thinking people of the country to unite against these destructive operations. I am very hopeful that much good will come out of my suggestion and believe that in some form an organization will be effected in the near future.

"Today one of the largest corporations in the country sent word to me, asking whether an association of the kind suggested had been formed, as it wished to send membership blanks to its stockholders throughout the country, to give them an opportunity to enroll."

Chicago Terminal Negotiations.

Negotiations between the railways that have asked ordinances for the new Union Station at Chicago and the City Council Committee on railway terminals have been going on during the past week, but with little progress toward an agreement. The city's representatives have insisted on certain terms of compensation for streets to be vacated, which they have varied from day to day, ranging from $2,000,000 to approximately $8,000,000 and a large number of other conditions, including payment for expensive street improvements and viaducts, which the railways have refused to accept. At a meeting on Saturday night, December 20, which was attended by Vice-President Turner, of the Pennsylvania lines, President Miller of the Chicago, Burlington & Quincy and President Earling of the Chicago, Milwaukee & St. Paul, the roads announced that they would not accept the ordinance with the conditions which the city had imposed and negotiations were temporarily broken off. Later it was decided to hold another meeting on Monday. The council committee has endeavored to settle the matter before January

1 for fear that the new state public utilities commission will take jurisdiction after that date.

On Monday of this week the railways sent a letter to the council committee, asking postponement of further consideration of the Union Station ordinances, and promising to present the railways' position as soon as possible.

International Railway General Foremen's Association.

At a meeting of the Executive Committee, held at the Hotel Sherman, Chicago, December 9, 1913, it was decided to hold the 1914 convention July 14 to 17 at the Hotel Sherman, Chicago. A campaign has been started to build up the membership and make the association the strongest of its kind in the country. The following papers have been selected for the 1914 convention program: Enginehouse Efficiency, by W. Smith, Chicago & Northwestern; Cylinders, Pistons, Crossheads, Guides and Valves, by J. T. Mullin, Lake Erie & Western; The Practice and Methods of Maintenance and Repairs to the Air Brake and Its Appurtenances, by C. M. Newman, Atlantic Coast Line; Autogenous Welding, by C. L. Dickert, Central of Georgia; Subsidiary Paper No. 1, The Taylor System, by W. W. Scott, Delaware, Lackawanna & Western; Subsidiary Paper No. 2, Railroading at a High Altitude, by J. W. Scott, Southern Railways of Peru.

The American Society of Mechanical Engineers.

On January 9 the American Society of Mechanical Engineers will hold a meeting jointly with the American Institute of Electrical Engineers and the New York section of the American Electro Chemical Society, in the Engineering Societies building, New York. The discussion for the evening will be: The Power Problem in the Electrolytic Deposition of Metals. Dr. C. O. Mailloux, president of the American Institute of Electrical Engineers, will preside. Papers will be presented by Lawrence Addicks, A. E. S., on The Limitations of the Problem; by H. E. Longwell, A. S. M. E., on The Mechanical Side of the Problem, and by F. D. Newbury, A. I. E. E., on the Electrical Side of the Problem. These papers will be illustrated.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May, 1914.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass. Convention, May 19, 1914, St. Louis.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill. Next convention, April 21, Houston, Tex.

American Association of Railroad Superintendents.—E. H. Harman, St. Louis, Mo.; 3d Thursday and Friday in May.

American Electric Railway Association.—E. B. Burritt, 29 W. 39th St., New York. Mid-year conference, New York, January 29, 30, 31.

American Electric Railway Manufacturers' Assoc.—H. G. McConnaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 20-22, 1914, Los Angeles, Cal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 17-20, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Karpen building, Chicago. June 15-17, Atlantic City, N. J.

American Railway Tool Foremen's Association.—A. R. Davis, Central of Georgia, Macon, Ga.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

American Society of Civil Engineers.—C. W. Hunt, 220 West 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wenlinger, 11 Broadway, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 20-22, 1914, New Orleans, La.

Association of American Railway Accounting Officers.—C. G. Phillips, Highland Park, Ill. Annual meeting, June 24, Minneapolis, Minn.

Association of Railway Claim Agents.—C. W. Egan, B. & O., Baltimore, Md. Next convention, May, 1914, St. Paul, Minn.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

Association of Railway Telegraph Superintendents.—P. W. Drew, 112 West Adams St., Chicago. Next convention, May 20-23, New Orleans, La.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York.

Association of Water Line Accounting Officers.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y.

Bridge and Building Supply Men's Association.—L. D. Mitchell, Detroit Graphite Co., Detroit, Mich. Meeting with American Railway Bridge and Building Association.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and August, Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d. Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after second Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. H. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va. Next convention, May 20-22, Galveston, Tex.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—C. G. Hall, 922 McCormick building, Chicago. Annual convention, May 18-22, Chicago.

International Railway General Foremen's Association.—Wm. Hall, 829 West Broadway, Winona, Minn., Next convention, July, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Next convention, third Tuesday in August.

Maintenance of Way & Master Painters' Association of the United States and Canada.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next convention, November 17-19, 1914, Detroit, Mich.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Next annual meeting, May 26-29, Hotel Waldron, Philadelphia.

Master Car Builders' Association.—J. W. Taylor, Karpen building, Chicago. June 10-12, Atlantic City, N. J.

Master Car & Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass.

National Railway Appliance Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3rd Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria; 2d Thursday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 30 Church St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Fire Protection Association.—C. B. Edwards, Mobile & Ohio, Mobile, Ala.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.

Railway Development Association.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. Next convention, September 8-10, 1914, Chicago.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Track Supply Association.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

Traffic Club of Chicago.—W. H. Wharton, La Salle Hotel, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Despatchers' Association of America.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 16, Jacksonville, Fla.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Next meeting, Chicago.

Utah Society of Engineers.—Fred D. Ulmer, Oregon Short Line, Salt Lake City, Utah; 3d Friday of each month, except July and August.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Karpen building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The amount of grain passing through Buffalo during the navigation season just closed was 192,000,000 bushels, an increase of 25,000,000 over last year. The previous high record was 221,000,000 in 1898. Of this year's total 22,000,000 was Canadian grain.

"Script," a substitute for mileage tickets, used interchangeably on the railways of California, is to be made available also on the principal electric roads. The admission of the electric lines to the fold of the script roads was in response to an application made by a number of electric lines. The script is issued in booklets of the denominations of $30 and $90, and on the use of all the script, which is good for rail or stage line travel, the user is entitled to rebates of five or ten mills a mile, depending on whether the maximum fare is three or four cents a mile.

A British View of the Panama Canal.

The significance of the Isthmian route, as we have suggested, can only be partially indicated at present by a comparison of statistics. The tolls factor, when it is finally decided—and we have not abandoned hope of better economic arrangements as the result of arbitration proceedings—will have an important bearing on the competing claims of the Panama and Suez Canal routes for trade in the zone that is approximately equidistant from British ports, or in that which is relatively nearer via Panama, but may be considerably cheaper via Suez. For the whole of Asia, and the greater part of Australasia, the Panama Canal offers no advantage (to the Thames trade). New Zealand is brought three days nearer to us, and some portions of Polynesia from five to ten days nearer; but the reduction of time may of course be very much more than offset by the augmented Canal dues. The saving is actual as well as relative only when the routes to the west coasts of North and South America are examined. Compared with voyages by the Straits of Magellan from London to any part of the American continental system, the saving of time by the Canal ranges from a week to almost three weeks. These are important figures. They appear to offer an immense stimulus to British shipping. But the appearance may be deceptive if the British shipowner is faced with Canal dues from which his American competitor is to be relieved. The exclusion of foreign competition from the American coasting trade will be complete, and it is not improbable that, by elastic interpretations of the law, the privileges of the American coaster may be stretched to cover a great part of what we should regard as deep-sea trading. The handicap with which our South American and West Canadian and Puget Sound trade is threatened renders it necessary that the British Foreign Office should continue with imperturbable courtesy to press for an impartial review of the circumstances under which American politicians are proposing to confer special privileges on their own trade for which the rest of the trading world will be heavily penalized.—*Manchester Guardian.*

The Railway Mail Service.

If you can imagine what it means to know the exact location of some ten thousand postoffices, to know by what railroad they are reached, and by which of these roads a letter will reach them quickest; through what junction points it must travel, and a hundred and one other things; and then to be able to throw letters into a half hundred pigeon-holes, each pigeon-hole representing a certain locality, and each letter going into the right pigeon-hole, at the rate of a hundred or more a minute, the while the train is thundering along at a forty or fifty mile gait, then you can grasp what it means to be a railway mail clerk.

It requires some 17,000 clerks to man the 3,400 railroad postoffices in the United States. The clerks must constantly study and memorize thousands of new postoffices, and the quickest way of reaching them. Out of every 10,000 pieces of mail handled by the railway mail service last year 9,997 were handled correctly.

Each clerk must undergo an average of about three examinations a year. The department has books printed giving full data about each postoffice in a given territory, and showing the system of distribution of mail so as to reach each one of them. The clerk must memorize all these, usually for all the postoffices in a given state at a time. Then he makes out a card for each postoffice, on the front of which there is the postoffice name and on the back the routing particulars. He buys himself a little case of pigeon-holes to correspond, except in dimensions, to the cases in the postal car. This little case contains 288 holes. He labels each hole. Then he must take the cards he has made out, and throw each card into its proper pigeon-hole. Not only must he learn to do it accurately, but rapidly as well. After he has satisfied himself with his proficiency in distributing these cards he goes before the inspectors and distributes the cards in their presence, being timed for speed and checked up for accuracy.

In each of these examinations the clerk must "throw" about a thousand cards, and he gets so many points off for each error and so many off for each minute above the standard it requires to "throw" a given number of cards. A clerk running from Washington to Greensboro, N. C., will, in the course of a few years, be required to pass an examination on the 2,500 postoffices in Virginia, the 1,800 in North Carolina, the 1,300 in Alabama, the 1,300 in Georgia, and those of three or four other states as well. Then, too, he must know in what package to tie every letter addressed to a street number in every one of the important cities like Washington, Baltimore, Philadelphia, or New York. Some of the clerks will correctly pigeon-hole 9,999 out of every 10,000.

The real secret of the efficiency of the mail service of the United States is due mainly to the railway postal clerk. When a person mails a letter in Washington for St. Louis, he can depend upon it that ninety-nine times out of a hundred his letter will reach the addressee on the first delivery from the first train into St. Louis from Washington after the letter was mailed. The Washington office makes up the St. Louis mail into bags. When they are on the last leg of the journey (from Indianapolis) the railway postal clerks empty their contents on the distributing tables and begin the work of throwing each piece into its proper pigeon-hole. A letter addressed to a certain number on Olive street goes to a certain carrier at the main office, and a letter to a suburban address goes to a certain carrier from a lettered station. The old system of carrying all mail from the city of origin to the city of destination without distribution according to streets would swamp the postoffices. The mail would have to be assorted piece by piece in the postoffice and the hour of delivery delayed greatly. —*Buffalo Commercial.*

INTERSTATE COMMERCE COMMISSION.

Hon. Judson C. Clements, of Georgia, was on December 23 renominated as a member of the Interstate Commerce Commission for another term of six years, and the nomination was confirmed by the Senate on the same day. Mr. Clements has been a member of the commission since 1892.

Commissioner Harlan held a hearing at Chicago on December 18 and 19, to consider the readjustment of rates from eastern points to Iowa in accordance with a recent decision of the commission.

The commission has suspended from December 15 to April 14 schedules in a Florida East Coast tariff proposed to effect increases in rates on tomatoes, in carloads, from Jacksonville, Fla., when from beyond, to various points west of the Mississippi river.

The commission has further suspended from December 16 to June 16, schedules in tariffs of F. A. Leland and Eugene Morris, which proposed increased rates on packing house products in carloads from Mason City, Iowa, to points in Arkansas and Texas.

The standard forms of blanks for freight claims which were adopted this year by the Freight Claim Association, have been informally approved by the Interstate Commerce Commission. This blank was described in the *Railway Age Gazette,* August 22, page 341.

The commission has suspended from December 10 to April 9, an item in a Chicago, Burlington & Quincy tariff which proposed to prohibit interchange switching between industries located on the tracks of the Chicago, Burlington & Quincy and

track connection with the Rock Island Southern at Galesburg, Ill.

The commission has further suspended from December 30 to June 30, a Kanawha & Michigan tariff which proposed to increase rates on bituminous coal, in carloads, from mines in Kentucky and West Virginia to Milwaukee, Wis., via. the Grand Trunk and car ferry across Lake Michigan for delivery beyond Milwaukee.

The commission has further suspended from December 18 to June 18, schedules in tariffs of the Illinois Central, which proposed to cancel proportional rates on grain and grain products in carloads, in connection with the Illinois Central from St. Louis, Mo., East St. Louis, Madison and certain other Illinois points to New York City and other eastern points.

The commission is to hold a hearing on January 22, upon the question of the proposed amendments or additions to the commission's regulations governing the transportation of explosives and other dangerous articles. Persons who desire to suggest changes should submit them at once to Col. B. W. Dunn, chief inspector of the bureau for safe transportation of explosives, as well as to the commission.

The commission has suspended to April 14 tariffs of the Pennsylvania Railroad, the Northern Central, the Philadelphia, Baltimore & Washington, and the West Jersey & Seashore, which proposed an increase of 15 cents per net ton in the commodity rates on stone from various points on lines of the Pennsylvania railroad and its connections in Maryland, Pennsylvania and Delaware to points in Delaware and Maryland.

The commission has further suspended from December to June 30 certain schedules in tariffs of Eugene Morris and W. H. Hosmer, which proposed to increase rates on soda crystals, bicarbonate of soda, bisulphate of soda, sal soda, silicate of soda, sulphate of soda, soda ash, caustic soda, sulphide of soda and sodium aluminum sulphate, in carloads, from Wyandotte and Detroit, Mich., and other points in Central Freight Association territory, to Canadian points.

Reduced New Haven Commutation Fares.

The commission in a supplemental order issued in connection with the New York commutation rate case has instructed the New York, New Haven & Hartford to establish before January 15 rates not in excess of the following for 60-ride monthly commutation tickets to New York and return; from Greenwich, $8.65; Cos Cob, $9.15; Riverside, $9.25; Sound Beach, $9.65, and Stamford, $10.25. All of these points are in Connecticut.

Reparation Awarded.

George A. Lee Company v. Illinois Central. Opinion by the commission:

The complainant shipped a mixed carload of incubators and brooders from Omaha to Memphis, Tenn., and charges were collected at the second class rate of 67 cents per hundred pounds. The commission finds that the rate charged should not have exceeded the third class rate of 47 cents, with a minimum of 18,000 lbs., for a standard 36 ft. car. (28 I. C. C., 515.)

Springfield, Ill. Awarded 113 Per Cent. Group Rates.

Springfield Commercial Association of Springfield, Ill., v. Pennsylvania Railroad, et al. Opinion by Commissioner Prouty:

Complaint is made that since Peoria, Ill., takes 110 per cent. of the New York-Chicago rates on traffic to and from the east, while Springfield, Ill., is in 117 per cent. territory there is a serious handicap laid upon the industries of Springfield, and it is insisted that Springfield should be placed in the Peoria group. Springfield at present is in the St. Louis group, although the distance to it from New York is about 60 miles less than to St. Louis. The commission finds that there is an actual burden placed upon the industry of Springfield, and holds that since the percentage rates are based mainly on distance the rates to Springfield should not exceed 113 per cent. of the New York-Chicago rates. (28 I. C. C., 511.)

Scrap Iron Rates.

Report by Commissioner Prouty:

It is proposed to increase scrap iron rates between Chicago and other points and Racine, Milwaukee, Wis., and other points from 60 cents per gross ton to 70 cents. The commission finds that in comparison with the rates on sheet iron, steel rails, ingots, coke and coal, etc., between these points and the rates on scrap iron between St. Paul and Chicago that a rate of 70 cents is not justified. A rate not to exceed 3 cents per 100 lb. will be allowed for the future. (28 I. C. C., 525.)

Complaint Dismissed.

Klauer Manufacturing Company v. Atchison, Topeka & Santa Fe. Opinion by Commissioner Clements:

The commission finds that the present ratings on corrugated iron and steel culverts in western classification No. 51 are not unreasonable. Classification, from its varied nature and use, cannot be so minute as to do mathematically exact justice to every variety of commerce that may move. The carriers endeavored to give culverts ratings which would fit the general situation presented. In the absence of evidence of unreasonableness or of undue discrimination it is sufficient that the ratings fixed are satisfactory to culvert manufacturers in general. (28 I. C. C., 508.)

Massachusetts-Maine Wool Rates.

Opinion by Commissioner Prouty:

It is proposed to increase the rate on wool in any quantity from Lawrence, Mass., to Lewiston, Me., from 12½ to 15 cents per 100 lb. At the present time the rate from Boston to Skowhegan is 17½ cents, while that from Lawrence is 20 cents. The rate from both Boston and Lawrence to Lewiston is 12½ cents per 100 lb. The proposed rate of 15 cents is equal to fifth class rates. The commission finds, therefore, that the respondents have justified this increase in view of these facts and the fact that in previous cases it has decided that eastern wool should be classified l. c. l., first class; c. l., third class, and when scoured c. l., second class. (28 I. C. C., 397.)

Rates on Coal to Milwaukee and Other Wisconsin Points.

Supplemental report by Commissioner Meyer:

In the original case, in which the delivering line involved was the Pere Marquette and car ferry line, it was held that routes and rates for the transportation of soft coal from mines in West Virginia and Kentucky on or tributary to the Chesapeake & Ohio and the Kanawha & Michigan to Milwaukee and other Wisconsin points for further shipment beyond those points, must be maintained. The supplemental case involves the Grand Trunk and car ferry lines as delivering lines. Since the conditions surrounding the transportation of coal from the mines in question to Milwaukee via the Grand Trunk have not been shown to be materially different from those obtaining via the Pere Marquette, the finding is the same as in the original case, viz., that the present routes must be maintained and that proportional rates may be increased not more than 10 cents per ton. (28 I. C. C., 527.)

Complaint Dismissed.

Scott-Mayer Commission Company v. Chicago, Rock Island & Pacific, et al. Opinion by the commission:

The complainant alleges that the defendants' separately established rate of 19 cents per hundred pounds on apples in carloads from Memphis, Tenn., to Little Rock, Ark., applicable to through shipments from the Cumberland Valley region of Pennsylvania, is unreasonable and unjustly discriminatory because defendants maintain a proportional rate of 13 cents from Memphis to Little Rock on apples forwarded as through shipments to Little Rock from points in western New York. No evidence was presented to show that the 19-cent rate was unreasonable, except as compared to the 13-cent rate, nor was any complaint made against the unreasonableness of the through rate. The commission holds that under the circumstances it will not disturb the factor under consideration, except upon the showing that such factor or the through rate of which it is a part, is unreasonable or otherwise in violation of the act. (28 I. C. C., 529.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER, 1913.

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Operating expenses: Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Chicago, Indianapolis & Louisville	359	$343,407	$27,953	$384,272	$74,027	$92,796	$6,361	$124,484	$10,404	$308,072	$76,200	$308	$15,282	$61,226	—$56,728
Denver & Salt Lake	215	63,168	19,184	88,055	14,953	11,634	1,607	27,015	5,996	61,205	26,850	.....	4,000	22,850	—13,803
Georgia	307	283,663	76,108	379,441	26,673	50,348	12,274	140,078	10,407	239,780	139,661	.....	2,950	136,711	147,688
Louisiana Western	208	118,525	56,407	184,955	26,186	47,183	7,971	68,230	6,598	156,168	28,787	—1,745	7,375	19,667	—43,108
Missouri, Oklahoma & Gulf	332	90,122	23,056	119,908	19,586	16,043	5,407	50,595	6,713	98,344	21,564	473	6,000	16,037	—23,242
Morgan's L. & Tex. R. R. & S. S. Co.	404	251,959	96,268	378,584	52,083	60,510	13,241	181,557	11,891	319,282	59,303	—3,207	18,250	37,846	—28,092
Norfolk Southern	569	214,928	77,575	317,039	43,896	37,827	4,496	97,547	15,754	199,520	117,519	—277	9,280	107,962	10,859
Oahu Ry. & Land Co.	101	56,035	25,736	86,517	9,753	8,103	832	21,752	4,065	44,505	42,012	—5,060	8,130	28,822	—10,314
St. Louis, San Francisco & Texas	244	98,032	37,646	143,984	23,066	22,319	2,117	50,683	6,030	104,115	39,869	.....	1,225	38,644	—6,090
St. Louis Southwestern of Texas	811	315,907	118,987	474,890	93,890	114,059	13,018	170,043	21,518	412,528	62,362	—469	17,800	44,093	—76,336
Southern Pacific Co.	6,380	5,798,584	2,787,587	9,210,223	838,537	1,109,218	163,779	2,302,463	230,564	4,644,561	4,565,662	176,811	401,346	4,341,127	6,771
Ulster & Delaware	129	63,780	20,706	88,762	16,946	13,590	961	38,977	3,103	73,577	15,185	108	3,500	11,793	—5,341
Western Maryland	661	633,507	95,194	758,641	121,953	128,060	23,439	337,151	17,930	628,533	130,108	.....	21,000	109,108	29,033

FOUR MONTHS OF FISCAL YEAR, 1914.

Chicago & Erie	270	1,466,281	267,721	1,897,772	427,118	460,990	84,465	942,148	50,557	1,967,278	—69,506	—18,787	57,848	—146,141	—239,276
Chicago & Northwestern	8,091	20,360,757	8,284,033	31,352,178	4,923,101	4,393,409	487,122	10,976,709	572,599	21,352,940	9,999,238	13,469	1,280,000	8,732,707	—183,724
Chicago, Burlington & Quincy	9,129	23,598,835	8,738,036	35,269,130	4,410,795	5,698,261	561,404	10,415,136	694,477	21,780,073	13,489,057	—52,599	1,217,135	12,219,323	28,555
Chicago Great Western	1,496	3,535,585	1,268,746	5,183,107	831,022	796,903	196,056	1,772,128	142,007	3,738,116	1,441,991	2,301	154,601	1,292,691	—64,536
Chicago, Indiana & Southern	359	1,246,174	124,295	1,417,133	244,490	424,593	28,672	475,350	41,527	1,214,632	202,501	3,844	61,130	145,215	—141,355
Chicago, Indianapolis & Louisville	359	1,246,174	124,296	1,417,133	244,490	424,593	28,672	475,351	41,526	1,214,632	202,501	3,844	61,130	145,215	—141,355
Chicago Junction	12	.....	.....	731,140	83,754	27,028	5,436	365,206	14,609	496,033	235,107	.....	10,137	224,970	1,025
Chicago, Milwaukee & St. Paul	9,690	23,474,960	7,446,225	33,533,185	4,815,591	4,899,923	676,942	11,289,136	580,323	22,261,915	11,271,270	145,109	1,394,948	10,021,431	—2,054,838
Chicago, Peoria & St. Louis	255	426,622	132,238	592,880	112,894	133,457	27,960	271,203	20,051	565,565	27,315	.....	19,200	8,115	—61,413
Chicago, Rock Island & Gulf	477	695,652	238,146	1,008,207	113,847	150,755	40,209	382,411	31,129	718,351	289,856	—4,363	39,465	246,028	—113,344
Chicago, Rock Island & Pacific	7,525	15,183,268	7,108,127	23,743,065	3,403,580	3,408,694	639,136	9,052,034	609,982	17,113,426	6,629,639	—57,552	1,121,922	5,450,165	—1,051,701
Chicago, St. Paul, Minneapolis & Omaha	1,747	4,006,060	2,058,536	6,462,600	1,152,170	769,823	115,855	2,355,430	138,554	4,531,832	1,930,768	13,933	314,732	1,629,969	—86,368
Chicago, Terre Haute & Southeastern	362	661,372	74,042	753,415	128,061	189,600	15,964	228,718	35,043	597,386	156,029	—1,194	46,000	108,835	—9,287
Cincinnati, Hamilton & Dayton	1,015	2,692,913	675,534	3,782,508	584,769	608,151	96,606	1,686,291	80,097	3,055,914	726,594	.....	138,850	587,744	—439,813
Cincinnati, New Orleans & Texas Pacific	337	2,686.907	683,277	3,542,900	362,121	898,417	99,461	996,562	79,201	2,435,762	1,107,138	—2,832	120,000	984,306	—56,100
Cincinnati Northern	245	432,159	96,440	553,000	118,341	151,246	11,374	232,912	14,226	528,099	24,901	.....	22,000	2,901	—106,441
Cleveland, Cincinnati, Chic. & St. Louis	2,014	8,087,674	3,244,431	12,394,266	1,857,598	3,128,265	314,025	4,988,697	250,398	10,538,983	1,855,283	6,591	426,400	1,435,474	—2,042,311
Colorado & Southern	1,127	2,235,912	683,027	3,082,498	442,337	718,958	47,242	871,614	87,399	2,167,550	914,948	—4,970	127,700	782,278	36,242
Colorado Midland	338	528,389	125,039	695,962	145,037	148,856	34,937	295,103	22,925	646,858	49,104	—1,277	32,000	15,827	—99,623
Cumberland Valley	162	891,450	277,302	1,221,248	279,084	124,815	20,637	392,539	32,319	849,394	371,854	608	22,809	349,653	—73,969
Delaware & Hudson Co.—Railroad Dept.	854	6,858,859	1,472,511	8,589,429	642,085	1,237,006	118,641	2,819,318	256,004	5,073,054	3,516,375	—9,166	198,800	3,308,409	—17,428
Delaware, Lackawanna & Western	960	10,302,968	3,314,309	14,534,753	2,019,281	2,171,001	306,869	4,200,444	263,869	8,961,464	5,573,289	176,815	660,000	5,090,104	—138,843
Denver & Rio Grande	2,585	6,365,108	2,356,625	9,112,445	1,600,689	1,581,415	175,731	2,634,675	214,238	6,206,748	2,905,697	22,313	369,600	2,558,410	—186,645
Denver & Salt Lake	215	290,464	203,129	519,969	78,093	62,066	11,728	134,456	17,703	304,046	215,923	.....	16,000	199,923	27,935
Detroit & Mackinac	411	283,936	132,740	445,076	53,678	64,700	10,832	152,724	10,591	292,525	152,551	893	33,659	115,785	12,244
Detroit & Toledo Shore Line	79	511,978	.....	514,553	61,663	28,470	5,719	140,168	10,798	246,818	267,735	.....	23,600	244,135	62,395
Detroit, Grand Haven & Milwaukee	191	496,500	277,500	891,302	105,337	113,008	26,213	418,762	22,223	685,543	205,759	499	14,400	191,858	149,466
Detroit River Tunnel	2	.....	.....	423,539	12,901	13,247	.....	36,173	149	62,470	361,069	.....	20,500	340,569	24,654
Detroit, Toledo & Ironton	441	445,502	58,419	552,370	159,653	211,294	9,776	298,233	22,463	701,419	—149,049	.....	22,800	—171,849	—303,093
Duluth & Iron Range	272	4,117,971	99,681	4,261,410	402,469	313,906	4,756	824,554	49,838	1,595,523	2,665,887	23,881	233,018	2,456,750	—11,174
Duluth, Missabe & Northern	356	4,767,251	136,675	4,942,918	403,653	394,712	9,483	789,828	47,691	1,645,367	3,297,551	21,351	279,223	3,039,679	209,477
Duluth, South Shore & Atlantic	627	768,220	457,190	1,320,321	352,280	147,451	35,197	449,711	44,761	1,029,400	290,921	7,795	72,000	226,716	3,940
Duluth, Winnipeg & Pacific	166	481,752	94,956	589,364	137,874	68,234	7,636	220,638	24,249	458,631	130,733	.....	29,480	101,253	36,204
El Paso & Southwestern Co.	982	2,327,856	387,013	2,838,479	529,122	401,997	61,856	779,662	107,351	1,879,988	958,491	—6,371	150,000	802,120	—361,066
Elgin, Joliet & Eastern	804	4,239,365	17	4,529,921	717,681	855,815	24,607	1,250,544	72,391	2,921,038	1,608,883	.....	124,262	1,484,621	—541,397
Erie	1,988	13,937,434	3,770,831	19,147,110	2,725,862	3,474,679	423,217	6,223,477	424,709	13,271,944	5,875,166	—72,614	601,821	5,200,731	—1,184,870
Florence & Cripple Creek	87	351,445	108,063	468,525	67,171	39,607	9,534	117,114	16,530	249,956	218,569	.....	7,717	210,852	10,875
Florida East Coast	696	609,029	424,003	1,184,985	316,489	257,036	27,079	514,004	44,761	1,159,369	25,616	—6,113	80,000	—60,497	—98,233
Fort Worth & Denver City	454	1,089,854	605,974	1,780,569	246,436	326,752	30,531	656,463	60,787	1,320,969	459,600	—2,738	67,000	389,862	—298,671
Galveston, Harrisburg & San Antonio	1,339	2,930,668	1,103,889	4,249,391	437,747	797,317	133,155	1,600,414	132,637	3,101,270	1,148,121	—9,103	239,350	899,668	—210,849
Georgia	307	762,710	319,059	1,152,303	128,802	188,001	47,353	512,059	35,953	912,168	240,135	.....	11,814	228,321	173,442
Georgia, Southern & Florida	395	476,550	281,419	848,528	108,753	167,652	32,083	344,957	39,799	693,244	155,284	.....	42,632	112,652	4,516
Grand Rapids & Indiana	578	1,084,210	864,596	2,102,717	287,803	299,397	54,523	847,975	63,425	1,553,123	549,594	—124	94,948	454,522	—63,069
Grand Trunk Western	347	1,494,000	887,500	2,527,087	302,532	439,380	87,291	1,130,652	67,088	2,026,943	500,144	—6,236	126,000	367,908	—191,373
Great Northern	7,748	23,581,754	6,428,885	31,892,880	4,698,374	3,361,046	475,570	7,698,164	465,098	16,698,252	15,194,628	123,751	1,634,482	13,683,897	548,190
Gulf & Ship Island	308	536,778	151,651	733,508	83,954	128,917	11,078	184,445	32,890	441,284	292,224	.....	28,139	264,085	61,214
Gulf, Colorado & Santa Fe	1,596	3,307,957	1,142,171	4,725,413	771,083	749,921	105,412	1,735,174	126,309	3,487,899	1,237,514	.....	209,106	1,028,408	—417,685
Hocking Valley	352	2,472,743	365,911	3,056,272	331,082	523,531	35,282	916,647	59,702	1,866,244	1,190,028	.....	164,000	1,026,028	17,500
Houston, East & West Texas	191	295,969	141,954	464,812	76,325	53,861	7,952	189,795	16,381	344,314	120,498	.....	24,211	96,287	—48,168
Houston & Texas Central	789	1,634,630	753,874	2,546,389	313,784	345,662	62,825	1,067,295	70,933	1,860,499	685,890	1,412	129,228	558,074	—175,171
Illinois Central	4,763	15,038,185	4,964,199	22,847,135	3,528,138	5,202,456	421,908	8,021,577	522,980	17,697,059	5,150,076	—9,652	1,056,000	4,084,424	322,238
Indiana Harbor Belt	105	.....	.....	1,130,867	180,370	137,598	11,454	519,827	30,782	880,031	250,836	12,132	22,000	240,968	—99,565
International & Great Northern	1,160	2,700,238	854,428	3,786,675	456,659	467,957	104,597	1,472,197	128,359	2,629,769	1,156,906	—4,959	89,841	1,062,105	—336,184
Kanawha & Michigan	177	1,058,706	142,711	1,228,577	177,515	257,616	11,209	343,339	27,684	817,363	411,214	4	37,938	373,280	—80,773
Kansas City Southern	827	2,574,288	606,556	3,533,050	328,710	452,999	108,412	1,157,565	134,976	2,182,662	1,350,388	.....	160,052	1,190,336	—104,458

REVENUES AND EXPENSES OF RAILWAYS.

FOUR MONTHS OF FISCAL YEAR, 1914—CONTINUED.

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Lake Erie & Western	906	$1,662,799	$343,556	$2,131,991	$374,268	$446,138	$47,992	$799,257	$48,846	$1,716,501	$415,490	.....	$88,852	$326,638	—$220,876
Lake Shore & Michigan Southern	1,853	12,826,767	5,097,984	20,120,372	2,845,698	4,112,190	375,861	6,613,536	380,795	14,328,080	5,792,292	$66,623	615,000	5,243,915	—1,857,113
Lehigh & Hudson River	97	556,845	20,350	612,638	139,869	97,943	6,136	222,660	16,816	483,424	129,214	.....	16,000	113,214	—71,315
Lehigh & New England	269	601,427	5,350	623,176	92,203	84,183	9,581	154,465	14,264	354,696	268,480	.....	12,714	255,766	—27,487
Lehigh Valley	1,438	12,087,551	1,978,686	14,581,420	1,701,039	2,498,615	345,035	4,775,193	275,664	9,595,546	4,985,874	—89,302	484,000	4,412,572	—758,885
Long Island	399	1,132,219	3,370,160	5,040,723	559,335	466,543	80,949	1,950,663	108,044	3,165,534	1,875,189	—10,215	254,640	1,610,334	—249,711
Louisiana & Arkansas	279	456,207	92,405	568,510	100,614	85,493	10,041	145,078	21,054	362,280	206,230	.....	16,666	189,564	28,226
Louisiana Ry. & Navigation	351	505,566	101,199	646,586	129,920	79,954	26,287	266,314	23,562	526,037	120,549	.....	22,000	98,549	—82,584
Louisiana Western	208	470,602	248,578	757,263	87,235	173,182	29,607	238,387	25,756	554,167	203,096	—817	29,500	172,779	—74,421
Louisville & Nashville	4,923	15,119,249	4,785,005	21,142,239	3,293,038	4,184,781	422,063	6,949,733	413,449	15,263,064	5,879,175	—90	602,433	5,276,652	224,095
Louisville, Henderson & St. Louis	200	298,183	154,037	479,856	95,623	58,932	17,741	149,970	12,308	334,664	145,192	966	14,400	131,758	78,359
Maine Central	1,207	2,407,629	1,518,838	4,184,356	730,661	614,994	52,757	1,546,019	104,982	3,049,413	1,134,943	—7,359	189,289	938,295	—185,758
Michigan Central	1,819	7,562,524	3,698,483	12,446,236	2,087,219	2,183,216	273,040	4,962,025	211,845	9,717,345	2,728,891	1,110	464,000	2,266,001	—1,221,737
Midland Valley	373	401,026	165,608	595,913	120,475	111,493	10,311	198,966	24,831	466,076	129,837	233	23,947	106,123	—7,672
Minneapolis & St. Louis	1,586	2,447,837	760,379	3,406,963	478,340	464,622	70,309	1,207,845	78,447	2,299,563	1,107,400	—196	134,234	972,970	—64,504
Minneapolis, St. Paul & Sault Ste. Marie	3,979	7,786,629	2,730,972	11,137,249	1,458,479	1,621,527	226,439	3,318,114	211,368	6,835,927	4,301,322	91,756	507,923	3,885,155	790,764
Missouri & North Arkansas	365	278,424	162,565	466,001	104,133	74,057	14,548	166,889	21,936	381,563	84,438	.....	22,000	62,438	70,038
Missouri, Kansas & Texas System	3,817	7,345,251	3,469,423	11,574,631	1,837,620	1,441,720	252,391	4,155,614	374,933	8,062,278	3,512,353	—44,703	482,600	2,985,050	—585,088
Missouri, Oklahoma & Gulf	332	304,206	91,994	413,473	71,824	62,660	23,224	179,734	25,855	363,297	50,176	1,833	24,000	28,009	—10,697
Missouri, Okla. & Gulf Ry. Co. of Texas	19	35,001	2,295	37,821	3,660	8,103	716	20,913	2,709	36,101	1,720	.....	685	1,035	3,756
Missouri Pacific	3,920	7,545,517	1,866,171	10,210,454	1,648,575	1,898,705	253,164	3,974,283	284,522	8,059,249	2,151,205	—16,409	376,070	1,758,726	—244,965
Mobile & Ohio	1,122	3,594,850	541,578	4,377,422	521,723	868,938	157,136	1,601,420	125,138	3,274,355	1,103,067	—5,606	132,323	965,138	—39,686
Monongahela	67	522,202	11,548	541,853	73,242	31,717	1,529	104,455	8,589	219,532	322,321	.....	9,400	312,921	14,412
Monongahela Connecting	6	.....	.....	366,316	45,629	70,343	1,200	165,511	10,144	292,827	73,489	.....	10,910	62,579	—61,290
Morgan's La. & Tex. R. R. & S. S. Co.	404	949,101	397,938	1,455,434	184,640	288,329	48,035	623,567	48,879	1,193,450	261,984	—7,780	73,000	181,204	21,073
Nashville, Chattanooga & St. Louis	1,231	2,859,981	1,140,580	4,289,031	678,010	846,019	167,270	1,599,094	120,603	3,410,996	878,035	—2,804	101,300	773,871	—156,947
Nevada Northern	165	530,856	54,683	599,974	69,470	71,497	1,433	141,418	17,493	301,311	298,663	.....	33,291	265,372	15,072
New Orleans & North Eastern	196	1,058,961	226,237	1,375,738	147,060	281,869	41,301	512,362	48,106	1,025,698	350,040	—853	63,200	285,987	54,837
New Orleans Great Northern	283	464,221	139,044	654,457	88,656	64,920	11,555	188,551	29,330	383,012	271,445	—384	9,334	2,617,727	66,074
New Orleans, Mobile & Chicago	403	566,992	133,139	745,665	99,010	76,846	14,953	234,969	30,002	455,780	289,885	—429	27,269	262,187	16,823
New Orleans, Texas & Mexico	286	335,379	71,323	487,059	124,921	46,034	12,388	199,341	37,828	420,512	66,547	.....	5,734	60,813	—20,409
New York Central & Hudson River	3,751	24,058,009	13,930,515	42,340,359	6,546,259	7,868,541	816,902	14,454,005	993,667	30,679,374	11,660,985	—12,755	2,388,200	9,260,030	—697,220
New York, Chicago & St. Louis	566	3,336,038	654,445	4,131,151	563,270	685,232	197,415	1,703,311	73,023	3,222,251	908,900	—10,150	147,000	751,750	—353,323
New York, New Haven & Hartford	2,060	11,410,846	10,300,936	24,040,218	3,195,197	3,231,986	179,759	9,029,890	577,469	16,214,301	7,825,917	34,492	1,220,000	6,640,409	—2,509,308
New York, Ontario & Western	566	2,425,091	948,385	3,569,921	575,144	546,578	44,815	1,185,380	66,082	2,417,999	1,151,922	—245	76,000	1,075,677	—194,195
New York, Philadelphia & Norfolk	112	1,095,406	207,551	1,396,930	115,824	291,204	20,925	584,435	55,667	1,068,055	328,875	.....	32,000	296,875	—47,478
New York, Susquehanna & Western	154	692,997	206,605	1,010,714	161,934	131,219	8,724	407,701	30,714	740,292	270,422	7,301	63,238	214,485	12,377
Norfolk & Western	2,035	13,554,370	1,871,798	15,979,393	2,035,635	3,245,226	246,808	4,885,366	302,960	10,715,995	5,263,398	—6,163	500,000	4,757,235	—284,963
Norfolk Southern	569	689,061	307,219	1,099,125	142,256	155,818	18,493	347,004	58,869	722,440	376,685	—628	36,909	339,148	—2,377
Northern Central	472	3,466,822	984,967	4,753,289	642,840	1,043,375	79,771	2,211,529	112,106	4,089,621	663,668	4,092	173,561	494,199	—289,983
Northern Pacific	6,313	18,529,826	6,507,798	26,665,744	4,211,690	3,086,412	455,429	7,940,093	336,707	16,032,331	10,633,413	190,039	1,444,080	9,399,372	—516,031
Northwestern Pacific	401	614,634	840,729	1,548,773	207,892	156,481	16,692	479,091	48,252	908,408	640,365	.....	60,400	579,965	3,419
Oahu Ry. & Land Co.	101	326,893	104,998	458,622	35,296	32,259	2,625	91,811	17,742	179,733	278,889	—10,482	27,870	240,537	4,721
Oregon Short Line	2,023	6,055,862	1,997,119	8,539,654	1,062,776	958,716	158,894	1,945,578	211,212	4,337,176	4,202,478	51	514,320	3,688,209	—306,337
Oregon-Washington R. R. & Nav. Co.	1,914	4,386,438	1,987,344	6,811,345	1,040,914	735,554	218,530	2,147,686	235,065	4,377,749	2,433,596	—25,950	451,873	1,955,773	—448,526
Pecos & Northern Texas	482	621,255	174,351	839,766	98,275	158,242	11,153	248,408	26,456	542,534	297,232	.....	30,145	267,087	—15,973
Pennsylvania *Co.*	1,751	18,654,795	3,878,089	24,763,137	3,326,035	4,416,107	360,722	8,615,571	443,785	17,162,220	7,600,917	—35,504	1,016,375	6,549,038	—1,125,372
Pennsylvania *Railroad*	4,032	47,084,869	14,286,165	65,765,735	8,179,971	13,284,550	985,260	23,043,057	1,477,892	46,970,730	18,795,005	—615,575	2,520,918	15,658,512	—799,629
Peoria & Eastern	352	816,173	266,226	1,182,499	167,377	256,467	21,852	457,397	23,394	926,487	256,012	.....	43,600	212,412	—163,876
Pere Marquette	2,325	3,732,034	1,674,458	5,936,696	1,050,017	1,231,920	134,664	2,416,695	166,605	4,999,901	936,795	—10,649	199,167	726,979	—743,089
Philadelphia & Reading	1,020	13,130,978	2,665,572	16,579,540	1,867,709	3,004,913	190,589	5,367,886	253,337	10,684,434	5,895,106	95,229	410,983	5,579,352	—1,396,676
Philadelphia, Baltimore & Washington	713	3,691,889	2,971,450	7,368,433	1,224,099	1,376,579	156,204	3,083,398	194,275	6,034,555	1,333,878	.....	222,036	1,111,842	—486,629
Pittsburgh & Lake Erie	223	6,017,288	708,426	6,972,768	739,880	1,290,874	63,285	1,630,118	114,414	3,838,571	3,134,197	872	228,000	2,907,069	—676,430
Pittsburgh, Cincinnati, Chic. & St. Louis	1,472	11,002,330	3,350,998	16,031,371	2,462,997	3,164,271	295,366	5,921,465	301,877	12,145,976	3,885,395	—2,796	604,279	3,278,320	—909,318
Pittsburgh, Shawmut & Northern	282	700,799	46,044	756,921	197,329	200,672	7,219	261,239	20,395	686,854	70,067	.....	7,314	62,753	—117,636
Port Reading	21	408,974	.....	415,568	65,839	447	123	122,386	3,811	192,606	222,962	—645	40,000	182,317	—188,316
Richmond, Fredericksburg & Potomac	88	462,092	317,202	893,994	104,526	112,545	12,992	340,530	27,631	598,224	295,770	—2,410	32,410	260,950	—39,269
Rutland	468	692,651	536,980	1,420,439	149,946	278,588	41,440	499,308	23,531	992,813	427,626	676	68,404	359,898	5,252
St. Joseph & Grand Island	319	395,027	138,103	579,352	122,185	84,433	20,138	227,437	25,337	479,530	99,822	—26	25,007	74,789	—33,557
St. Louis & San Francisco	4,742	10,506,088	3,977,820	15,525,357	2,156,319	2,440,688	288,836	4,949,153	359,126	10,194,122	5,331,235	.....	497,376	4,833,859	163,570
St. Louis, Brownsville & Mexico	518	487,571	304,002	870,736	168,671	96,199	18,434	305,253	42,824	631,381	239,355	.....	22,000	217,355	17,048
St. Louis, Iron Mountain & Southern	3,365	8,352,505	2,182,445	11,309,211	1,638,649	1,922,265	214,076	3,404,061	289,046	7,468,097	3,841,114	—13,810	387,990	3,439,314	264,786
St. Louis Merchants' Bridge Terminal	9	.....	1,691	685,824	161,277	52,419	2,855	347,596	23,431	587,578	98,246	.....	22,400	75,846	—108,342
St. Louis, San Francisco & Texas	244	388,582	142,949	564,382	94,252	70,067	9,521	193,814	22,622	390,276	174,106	.....	4,900	169,206	51,956
St. Louis Southwestern	905	2,128,854	519,408	2,802,503	270,232	530,211	111,965	662,695	107,348	1,682,451	1,120,052	—5,998	120,928	993,126	—109,965
St. Louis Southwestern of Texas	811	1,085,579	467,945	1,677,799	393,235	404,077	49,508	652,507	80,067	1,579,394	98,405	—1,533	71,200	25,672	—344,704
San Antonio & Aransas Pass	724	1,280,778	544,535	1,917,502	294,662	270,477	25,789	678,751	45,589	1,315,268	602,234	.....	48,000	554,234	—245,737
San Pedro, Los Angeles & Salt Lake	1,133	2,136,140	1,124,101	3,510,261	447,885	589,742	128,390	1,149,264	74,833	2,390,114	1,120,147	—8,090	164,251	947,806	—187,047
Seaboard	3,082	5,222,022	1,735,127	7,742,406	967,739	1,072,581	261,843	2,885,488	238,158	5,425,809	2,316,597	—4,807	328,000	1,983,790	173,782
Southern	281	228,467	134,093	395,556	100,783	44,081	9,400	175,889	15,220	425,809	50,183	.....	27,248	22,935	9,761

REVENUES AND EXPENSES OF RAILWAYS.

FOUR MONTHS OF FISCAL YEAR, 1914—CONTINUED.

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total, inc. misc.	Operating expenses: Maintenance: Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Southern	7,037	$15,078,349	$6,895,450	$23,670,394	$3,225,999	$3,874,053	$728,058	$8,046,119	$671,362	$16,545,591	$7,124,803	$18,964	$840,743	$6,302,924	—$417,364
Southern Kansas of Texas	179	370,798	70,149	462,205	66,280	83,528	6,346	137,402	14,535	308,091	154,114	.....	16,928	137,186	—73,561
Southern Pacific Co.	6,380	20,031,274	11,299,624	33,818,414	3,540,905	4,561,269	640,225	8,977,170	926,194	18,645,763	15,172,651	623,867	1,605,267	14,191,251	—1,836,768
Spokane International	163	278,184	98,494	395,254	65,349	20,609	7,982	110,098	14,377	218,415	176,839	.....	12,082	164,757	—19,036
Spokane, Portland & Seattle	556	1,088,009	672,949	1,928,851	244,167	148,127	34,803	435,728	52,496	915,321	1,013,530	6,144	213,600	806,074	—33,223
Tennessee Central	294	400,665	170,615	602,656	117,423	55,214	22,715	200,631	29,276	425,259	177,397	.....	16,982	160,415	25,001
Terminal Railroad Ass'n of St. Louis	34	.....	958	1,001,652	180,126	86,913	3,643	366,072	20,417	657,171	344,481	19,500	106,600	257,381	—101,969
Texas & New Orleans	458	904,739	444,157	1,438,247	235,571	341,427	31,771	576,356	51,504	1,236,629	201,618	9,700	86,890	124,428	—54,220
Texas & Pacific	1,885	4,101,353	1,670,615	6,247,644	867,094	965,397	150,021	2,440,969	163,879	4,587,360	1,660,284	—5,540	192,576	1,462,168	525,016
Toledo & Ohio Central	443	1,907,149	259,769	2,305,171	385,789	429,490	38,316	848,995	39,397	1,714,987	563,184	—2,222	78,847	482,115	—78,689
Toledo, Peoria & Western	248	281,786	189,148	502,787	104,056	118,148	10,117	200,873	14,585	447,779	55,008	.....	20,000	35,008	—77,049
Toledo, St. Louis & Western	451	1,374,527	153,466	1,623,922	175,285	224,210	62,928	552,780	35,599	1,050,802	573,120	.....	62,600	510,520	172,206
Trinity & Brazos Valley	463	611,521	211,283	856,578	207,675	136,849	42,321	401,257	48,370	836,472	20,106	.....	21,990	—1,884	—192,491
Ulster & Delaware	129	249,017	204,811	477,195	66,293	53,725	7,168	188,177	12,231	327,594	149,601	—3	14,000	135,599	—19,102
Union Pacific	3,612	13,974,183	4,227,588	19,883,510	2,122,668	2,467,727	435,933	4,789,180	493,909	10,309,417	9,574,093	—12,906	711,351	8,849,836	—541,284
Union R. R. of Baltimore	9	487,251	98,551	592,896	45,491	.....	5,143	22,602	9,984	83,220	509,676	.....	24,047	485,629	21,403
Union R. R. of Pennsylvania	31	.....	.....	1,941,656	237,759	413,135	409	690,898	12,597	1,354,798	586,858	10,454	42,000	555,312	—255,727
Vandalia	910	2,826,772	936,641	4,192,919	569,269	779,732	110,197	1,552,360	79,666	3,091,224	1,101,695	.....	121,264	980,431	—114,373
Vicksburg, Shreveport & Pacific	171	348,820	202,298	596,348	105,504	118,634	13,919	199,321	20,755	458,133	138,215	—313	31,200	106,702	—2,038
Virginia & Southwestern	240	589,311	71,629	679,330	90,361	150,504	8,575	186,322	15,552	451,314	228,016	.....	23,909	204,107	42,516
Virginian	503	2,055,205	149,384	2,261,751	289,654	352,258	23,209	489,508	37,688	1,192,317	1,069,434	29,778	84,845	1,014,367	331,680
Wabash	2,515	7,437,212	2,880,848	11,247,679	1,363,365	1,882,230	370,975	4,255,158	281,058	8,152,786	3,094,893	—16,332	297,790	2,780,771	—233,773
Washington Southern	36	141,374	155,783	402,160	59,244	57,862	5,121	163,638	12,654	298,519	103,641	—746	14,027	88,868	—29,252
Western Maryland	661	2,365,670	488,989	2,981,474	478,395	441,958	102,550	1,278,791	72,569	2,374,263	607,211	.....	79,500	527,711	—48,848
Western Pacific	937	1,907,573	583,331	2,552,404	485,432	243,106	112,777	828,808	115,288	1,785,411	766,993	—1,872	122,746	642,375	—49,928
Western Ry. of Alabama	133	269,638	187,794	496,341	86,124	99,085	24,097	136,952	23,171	369,429	126,912	—59	19,353	107,500	10,485
West Jersey & Seashore	356	680,131	2,123,908	2,980,609	412,725	441,882	78,248	1,039,515	53,490	2,025,860	954,749	—15,284	110,071	829,394	—176,272
Wheeling & Lake Erie	459	2,822,489	258,812	3,236,351	583,814	576,681	34,379	965,264	70,989	2,231,127	1,005,224	—464	131,151	873,609	—186,875
Yazoo & Mississippi Valley	1,372	2,739,179	905,611	3,912,983	669,124	673,022	62,555	1,454,016	104,665	2,963,382	949,601	—3,241	172,000	774,360	312,801

Nashville Coal Rates Reduced.

The Traffic Bureau of Nashville, Tenn., v. Louisville & Nashville, et al. Opinion by Commissioner McChord:

Nashville, Tenn., through its traffic bureau as complainant, attacks the rate of one dollar per ton on coal to Nashville from western Kentucky mines on the Louisville & Nashville and the Illinois Central, and from mines in eastern Tennessee and Alabama on the Nashville, Chattanooga & St. Louis. This coal is being hauled to Nashville by the Louisville & Nashville at a rate of $1 per ton, which nets a per ton mile revenue of 9.2 mills for an average haul of 108.5 miles. At the same time coal is being carried from the same coal fields to Memphis, Tenn., at $1.10 per ton; the distance is 276 miles, which nets a per ton mile revenue of slightly less than four mills. The commission finds that there is no real dissimilarity in operating conditions as between the two points, and dismisses the contention that the difference in rates is caused by water competition at Memphis, by showing that the facts prove that the low rate is a result of rail competition. A like comparison may be made with Louisville, which has a 60-cent rate. The commission, therefore, prescribes a rate of 80 cents. A like rate from Nashville, Chattanooga and St. Louis mines in Tennessee and Alabama is also found to be unreasonable and a rate of 90 cents is prescribed, but the complaint as to the unreasonableness of the $1 rate to Nashville on coal from Illinois Central western Kentucky mines is not sustained. The question of switching at Nashville also arises. The Louisville & Nashville and the Nashville, Chattanooga & St. Louis interswitch all traffic, including coal at that point. They refuse to switch coal to and from the Tennessee Central, which road retaliates by refusing to switch coal to or from the rails of either of the other two. The commission finds that the practice of all three roads is unreasonable and further, that that of the Louisville & Nashville and the Nashville, Chattanooga & St. Louis is unjustly discriminatory. The discrimination is required to be removed and reasonable practice prescribed. "Terminals are either open or they are not" and a carrier may not exercise an arbitrary discretion, based upon a strained construction of the provision of section 3, in saying for what road and traffic it will open its terminals and for what other roads and traffic it will decline to do so. (28 I. C. C., 533.)

Grain Rates in Central Freight Association Territory.

Opinion by Commission Prouty:

The commission finds that the proposed increase in re-shipping rates on malt from Milwaukee and Chicago to points in Central Freight Association territory and to western termini of the trunk lines has been justified, for at present the present basis of rate is not equitable. For example, the joint through rate on malt from Minneapolis to Pittsburgh is 18 cents. At the same time there is a rate on malt and barley from Minneapolis to Chicago of 7½ cents and a re-shipping rate from Chicago to Pittsburgh of 9.2 cents, producing a combination from Minneapolis to Pittsburgh of 16.7 cents. Certain proposed increases in rates on by-products of grain from Mississippi river crossings have not been justified, for the increases have the effect of putting higher rates on the by-products than on the products with which they compete. Carriers also have not justified the proposed increases in proportional rates from upper Mississippi river crossings, for the rates from the upper and lower crossings should agree. The commission also holds that a general increase in grain rates from Illinois points to markets of consumption has been justified. It is felt that the rates on grain should be placed on a percentage basis just as the rates on other commodities. A comparison has been made between the proposed rates and dates adjudged from an application of percentage groups to the present 20½-cent grain rate, and it is found that the proposed rates would be exceeded by the percentage group rates. The commission does not pass on the lawfulness of certain individual rates. (28 I. C. C. 549.)

STATE COMMISSIONS.

Frank H. Funk has been appointed a member of the Illinios State Railroad and Warehouse Commission, succeeding J. A. Willoughby.

The sub-committee of the National Association of Railroad Commissioners, which is charged with matters in connection with

the valuation work of the Interstate Commerce Commission, has chosen as its chairman Milo R. Maltbie of the New York State Public Service Commission, First district.

The Public Service Commission of Pennsylvania has made public an opinion by its counsel, William N. Trinkle, to the effect that it is not illegal for the Pennsylvania and other roads of the state to furnish free transportation for cans of fish fry for the State Department of Fisheries. The Pennsylvania had decided that this service would be forbidden by the new law. Mr. Trinkle holds that the transportation furnished is in the public interest.

The California State Railroad Commission has revised and ordered reductions in the freight rates charged by the Sierra Railway Company operating in Calaveras, Tuolumne and San Joaquin counties, declaring that they are discriminatory. The commission finds that officers of the railway company are interested in certain lumber companies in that territory and that freight rates allowed on lumber shipped by those companies have been so low as to constitute direct discrimination against other shippers. The commission also challenges the company's argument that it should receive rates sufficiently high to enable the payment of interest on bonds and dividends on the present outstanding stock.

COURT NEWS.

In the Federal court in New York City, last week, Simon Lewie was fined $250 for false classification of freight in shipping decorated glass shades under the general classification of glass, thereby saving 16 cents per 100 lb. At the same time L. J. Botting was fined $500 for describing a mixed shipment as hardware and for billing cigarettes and tobacco as tobacco alone.

The Wichita Falls & Northwestern has been indicted by a federal grand jury at Lawton, Okla., for alleged rebating through rental for unloading facilities. In order to secure the hauling of material for some public works at Altus, Okla., the road agreed to furnish a place on its right of way for the city to unload; and having no such place one was rented by the company for that purpose. The rental money is held to be equivalent to a rebate.

On December 20, Judge McPherson, of the Federal Court at Kansas City, Mo., dismissed without prejudice the injunction suits in the Missouri 2-cent fare and maximum freight rate cases under the mandate of the United States Supreme Court, without retaining jurisdiction over the claims for refunds of the amounts collected in excess of the rates finally sustained. The attorney-general of the state immediately filed a suit against the Missouri Pacific for refunds amounting to about $2,000,000, after which the Court, at the petition of the railways, entered a new order suspending the decrees until Januray 10. The attorney-general announced that he would proceed with the filing of suits for refunds against the other roads.

A hearing in the suit of the protective committee of the minority stockholders of the St. Joseph & Grand Island against the Union Pacific to enforce the payment of dividends on the St. Joseph & Grand Island stock, was begun in the federal court at Omaha on December 17. It is charged that the Union Pacific, after obtaining control of the stock, has expended excessive amounts on improving a part of the line for the benefit of the Union Pacific, instead of paying dividends to which the stockholders are entitled. Nelson P. Loomis, in presenting the argument of the Union Pacific, said that the improvements were necessary for the sake of the St. Joseph & Grand Island itself, and are of greater benefit to it than the Union Pacific; that the additional business which the Union Pacific will turn over to the road will amount to $300,000 per year.

A Swiss Railroad Station.—The Swiss federal railway system has nearly completed its $600,000 railroad station at St. Gall. The structure is one of the finest stations in Switzerland. Its erection necessitated the building of a new postoffice immediately opposite, on which $700,000 has been spent. The old track through the streets of St. Gall has been abandoned and trains now run through the recently completed tunnel between St. Gall and St. Fiden.

Railway Officers.

Executive, Financial and Legal Officers.

John R. Kenly, third vice-president of the Atlantic Coast Line, with headquarters at Wilmington, N. C., has been elected president, succeeding T. M. Emerson, deceased.

B. C. Prince, assistant general freight agent of the Seaboard Air Line, at Jacksonville, Fla., has been appointed assistant to vice-president (in charge of traffic) with office at Norfolk, Va., effective January 1.

John H. Peyton, assistant to president of the Louisville & Nashville and chief engineer of construction of the Lexington & Eastern, with headquarters at Lexington, Ky., has been elected president of the Nashville, Chattanooga & St. Louis, effective April 1, 1914, succeeding John W. Thomas, Jr., deceased. In the meantime Maj. E. C. Lewis, chairman of the board, will serve as executive.

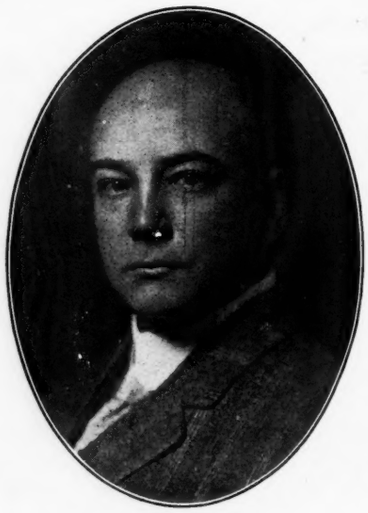
Operating Officers.

J. M. Davis, general superintendent of the central district of the Southern Pacific, with headquarters at San Francisco, Cal., has resigned, effective January 1, to accept service with another company.

J. S. Dean, trainmaster of the Northern Pacific at Tacoma, Wash., has been appointed assistant superintendent of the Tacoma division, with headquarters at Tacoma, succeeding T. E. Coyle, promoted; effective January 1.

Charles W. Jones, general manager of the third district of the Chicago, Rock Island & Pacific, with headquarters at El Reno, Okla., has been appointed general manager of the first district, with headquarters at Des Moines, Iowa, succeeding W. M. Whitenton, resigned; effective January 1. A photograph and sketch of Mr. Jones were published in the *Railway Age Gazette* of February 9, 1912, page 258.

Albert James Stone, general manager of the Eastern grand division of the Erie, with office at New York, will on January 1, succeed to the duties of vice-president J. C. Stuart, with authority throughout the Erie lines, and will be the ranking general manager, without a change of title, as has already been announced in these columns. Mr. Stone was born on February 20, 1873, at Holly, Mich., and was educated at Hornell High School at Hornell, N. Y., and at Elmira Business College, Elmira, N. Y. He began railway work on the New York, Lake Erie & Western as a messenger in 1888, and held various subordinate positions in the operating department of that road and its successor, the Erie, until 1902. From July, 1902, to November, 1903, he was assistant to the general manager of the same road, and then, to 1905, was general superintendent of the Delaware & Hudson. In November, 1905, he returned to the Erie and became assistant general manager of the Erie and its allied and controlled lines. On August 6, 1907, he was promoted to general superintendent. He has been general manager since the beginning of the present year.



A. J. Stone.

T. H. Beacom, assistant general manager of the first district of the Chicago, Rock Island & Pacific, at Des Moines, Ia., has been appointed general manager of the third district, with headquarters at El Reno, Okla., succeeding C. W. Jones. F. J.

Easley, assistant general manager of the third district, is appointed assistant general manager of the first district, with office at Des Moines, succeeding Mr. Beacom.

John J. Mantell, whose appointment as superintendent of the Wyoming division of the Erie, with headquarters at Dunmore, Pa., has been announced in these columns, was born at Elmira, N. Y., and was educated in the public schools of his native town and at Elmira Academy. He began railway work on June 24, 1899, as a clerk in the roadmaster's office of the Erie at Elmira, and has been in the continuous service of that road ever since. From 1899, to December, 1906, he was consecutively yard clerk, chief yard clerk, clerk stenographer, and assistant chief clerk in the division superintendent's office at Elmira, N. Y., also at Hornell, and in the general superintendent's office at Jersey City, N. J. In December, 1906, he was appointed yardmaster of the Jersey City Terminal, and in October, 1908, was made general yardmaster at Susquehanna, Pa. From June, 1909, for one year, he was traveling yardmaster on the general superintendent's staff, and then, to May, 1911, was trainmaster on the Delaware & Jefferson division. On May 1, 1911, he was appointed a special agent on the general superintendent's staff, becoming terminal trainmaster at Jersey City the following December, which position he held at the time of his recent appointment as superintendent of the Wyoming division of the same road, as above noted.

John B. Dickson, whose appointment as assistant general manager of the Ohio grand division of the Erie, with headquarters at Cleveland, Ohio, effective January 1, has already been announced in these columns, was born at Steubenville, Ohio, and began railway work in 1881, in the maintenance of way department of the Cleveland & Pittsburgh division of the Pennsylvania Lines West of Pittsburgh. From April, 1887, to February, 1893, he was supervisor of the same division, and then, to January 1, 1902, was roadmaster on the Galena division of the Chicago & North Western. He was then, for one year, assistant engineer, maintenance of way, on the Baltimore & Ohio, and was promoted in January, 1903, to engineer maintenance of way, becoming chief engineer maintenance of way of the same road in June, 1905. He was subsequently assistant to general manager of the Erie, and then superintendent of the Rochester division of the same road. On July 1, 1909, he was appointed general agent of the operating department of the Erie at Chicago, and in January, 1913, was made superintendent of the New York division, with headquarters at Jersey City, N. J., which position he held at the time of his recent appointment as assistant general manager of the Ohio grand division of the same road, as above noted.

J. B. Dickson.

Joseph Hildeburn Gumbes, whose appointment as superintendent of the Renovo division of the Pennsylvania Railroad, with headquarters at Renovo, Pa., has been announced in these columns, was born on November 27, 1866, at Oaks Station, Montgomery county, Pa., and was graduated from the engineering department of the University of Pennsylvania in the class of 1888. During his summer vacations he was employed in the engineering department of the Pennsylvania Railroad, and in the spring of 1888, he became a rodman on the Middle division. In December, 1890, he was transferred to the maintenance of way department at Altoona, becoming assistant supervisor in August, 1891, at Freeport, Pa. He was subsequently transferred in a similar capacity to Mifflin, on the Middle division. In July, 1897, he was promoted to supervisor at Millersburg, and in October, 1899, was transferred in the same capacity to the Monongahela division at Dravosburg, returning to Mifflin as supervisor in January, 1900. From December, 1901, to June, 1903, he was supervisor at New Florence, Pa., on the Pittsburgh division, and then was promoted to division engineer of the Monongahela division. On April 1, 1905, he was transferred as division engineer to the West Jersey & Seashore, and two years later became division engineer of the Pittsburgh division. He was promoted to assistant superintendent of the Pittsburgh division on March 3, 1911, with office at Youngwood, Pa., which position he held at the time of his recent appointment as superintendent of the Renovo division of the same road, as above noted.

Traffic Officers.

Ingram T. Sparks has been appointed traveling freight and passenger agent of the Southern Pacific and the Arizona Eastern at Phoenix, Ariz.

A. J. Patton has been appointed traveling freight agent of the Sunset-Central Lines at Waco, Tex., succeeding Robert Burns, who has been transferred to Houston, Tex.

The office and department of J. D. Cornell, general freight and passenger agent of the Rock Island Southern, will be removed on January 1, from Monmouth, Ill., to Davenport, Iowa.

Joseph A. S. Wallace, traveling freight agent of the Chicago, Milwaukee & St. Paul, at Pittsburgh, Pa., has been appointed traveling freight agent of the Western Maryland, with headquarters at Pittsburgh.

J. B. Gibson has been appointed traveling freight agent of the Kansas City Southern at Houston, Tex., succeeding H. G. Moran, who has been appointed soliciting freight agent of the Chicago, Rock Island & Pacific at Houston, succeeding P. L. McCue, resigned.

J. L. Greenwood has been appointed traveling freight agent of the International & Great Northern and the Texas & Pacific at Los Angeles, Cal., succeeding C. K. Blech, resigned, and A. E. Sinclair has been appointed traveling freight agent at San Francisco, Cal., succeeding R. C. Melvin, resigned.

Eugene Fox, general freight and passenger agent of the El Paso & Southwestern at El Paso, Tex., has been appointed assistant general traffic manager, with headquarters at Chicago, and William C. Barnes, assistant general freight agent at El Paso, has been appointed general freight agent, with headquarters at El Paso.

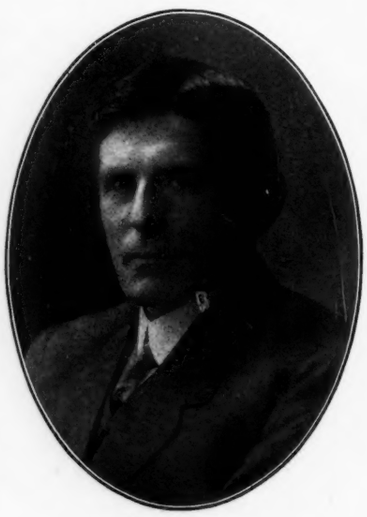
Engineering and Rolling Stock Officers.

William Garstang, general master car builder of the Cleveland, Cincinnati, Chicago & St. Louis and the Peoria & Eastern, will retire from railroad service at the end of the year, after an active career of 50 years in the mechanical department. Until February of this year, Mr. Garstang was superintendent of motive power of the Cleveland, Cincinnati, Chicago & St. Louis, the Peoria & Eastern, and the Cincinnati Northern, and had held the title of superintendent of motive power for 25 years, 20 years with the Big Four and for 5 years, from 1888 to 1893, with the Chesapeake & Ohio. In February of this year he was relieved of a portion of his duties, and has since served mainly in an advisory capacity with the title of general master car builder. His former duties will continue to be performed by S. K. Dickerson, superintendent motive power, and I. S. Downing, master car builder. Mr. Garstang was born February 28, 1851, in England, and was educated in

W. Garstang.

the public schools. In 1862 he carried water for the contractors on the laying of track from Fort Erie to Niagara on the Canadian shore of the Niagara river, and in December, 1863, entered railway service as a machinist apprentice on the Cleveland & Erie, now part of the Lake Shore & Michigan Southern, at Cleveland, Ohio, where he remained six years. During this period he went to night school and studied mathematics and mechanical drawing. He was then for 11 years machinist and general foreman of the Atlantic & Great Western and the New York, Pennsylvania & Ohio; for three years general foreman of the Cleveland & Pittsburgh division of the Pennsylvania; for five years master mechanic of the Cleveland, Columbus, Cincinnati & Indianapolis, now the Cleveland, Cincinnati, Chicago & St. Louis, and in 1888 he was appointed superintendent of motive power of the Chesapeake & Ohio. On April 1, 1893, he was appointed superintendent of motive power of the Cleveland, Cincinnati, Chicago & St. Louis, which position he held until February 10, 1913. He has thus been connected for approximately 30 years with Vanderbilt roads, and during that time he has been closely identified with the wonderful progress that has been made in railroading. During his first service on the Cleveland & Erie the link and pin coupler was used on passenger cars as well as freight cars; passenger cars were heated by wood stoves and lighted by sperm candles, and portable platforms were used between cars during stops to keep people from falling through; the locomotives burned wood, weighed only about 70,000 lbs., and were equipped with valve gears having the hook motion and the independent cut off, and wooden brake beams, brake heads and brake shoes were used, over the route that is now traversed by the Twentieth Century Limited. Mr. Garstang has been connected with the Master Car Builders' Association and Master Mechanics' Association for about 35 years, and was president of the Master Mechanics' Association in 1894 and 1895. He has served on the committees that adopted the M. C. B. standard car axle, journal box, journal brass, journal wedge, and the standard wheel, and for the past 12 years has been chairman of the committee on standard wheels. When this committee first took up the wheel question there were 45 different designs in use, which have now been reduced to designs for 60,000, 80,000 and 100,000 lb. capacity cars. One of his most important recent achievements was the erection of the Big Four shops at Beech Grove, Ind., which he designed and contracted for, and the work was carried on under his supervision, in addition to his other duties.

William Cary Hattan, whose appointment as division engineer of the Carolina, Clinchfield & Ohio, with headquarters at Dante, Va., has been announced in these columns, was born on December 15, 1875, in Rockbridge county, Va. He took a course in civil engineering at the Washington and Lee University and received the degree of B.S. In July, 1899, he began railway work with the West Virginia Short Line, now a part of the Baltimore & Ohio, and held various positions, including that of rodman, until 1902. He was then resident engineer of the Ozark & Cherokee Central, now a part of the St. Louis & San Francisco, and later assistant engineer of Vandewater & Hood, civil engineers of Baltimore, Md. In 1904 he became resident engineer on the Cumberland extension of the Western Maryland, and from 1906 to 1909 was resident engineer on the Carolina, Clinchfield & Ohio in charge of heavy tunnel and viaduct work. During the next two years he was division engineer for the Carter Construction Company in charge of sub-contractors at work on extension to Connellsville. In 1912 he was made resident engineer on the Elkhorn extension of the Carolina, Clinchfield & Ohio, which position he held at the time of his recent appointment as division engineer of the same road, as above noted.



W. C. Hattan.

W. F. Drysdale, mechanical engineer of the Northern Railway of Costa Rica at Limon, Costa Rica, has resigned to engage in other business.

R. L. Cooper has been appointed chief engineer of the Ft. Dodge, Des Moines & Southern, with headquarters at Boone, Iowa. He was previously engineer of the Conn Construction Company.

W. K. Walker, general roadmaster of the Missouri Pacific at Wichita, Kan., has been appointed engineer in charge of the South Omaha improvements of the road, including a new yard and a large viaduct.

OBITUARY.

F. S. Savage, for the past 22 years connected with the passenger department of the Atchison, Topeka & Santa Fe, a part of the time as advertising manager, died in Topeka, Kan., on December 20.

David S. Sutherland, general agent of the Michigan Central at Detroit, Mich., died at his home in Detroit on December 17. He was born in 1849 at Detroit, and had been in the service of the Michigan Central since 1864, when he started as messenger. He was later yardmaster, trainmaster and from 1880 to 1912 superintendent. On August 15 he was appointed general agent.

Christer P. Sandberg, Member of the Institute of Civil Engineers, the well known designer of the Sandberg sections of rails, died at his home in London, Eng., December 4, at the age of 81. Mr. Sandberg was born in Sweden, but had lived in England for the last 50 years. In 1868 he was awarded the Telford gold medal and a premium for his paper on the manufacture and wear of rails, an essay which is still looked upon as a standard discussion of the subject. For 40 years he had been consulting and inspecting engineer for the Swedish, Chinese and Siamese government railroads and for other railroads.

William Borner, formerly assistant to freight traffic manager of the Pennsylvania Lines at Chicago, died in that city on December 21. He was born on March 27, 1842, at Bedford, Pa., and was educated at Duff's Commercial College, Pittsburgh. He began railway work on January 1, 1857, as a messenger and was then clerk and later chief clerk of the Star Union Line until 1871, when he became cashier of the same company. From 1877 to 1881 he was agent of the Pennsylvania Company, and then to 1910 was general western and division freight agent of the same company. From 1910 to April 1, 1912, he was assistant to freight traffic manager of the Pennsylvania Lines, and then entered the banking department of the Harris Trust & Savings Bank, Chicago.

A RAILWAY TAX IN MANCHURIA.—On October 1 the administration of the Chinese Eastern introduced a so-called pood tax which is to be collected on each pood (36.1128 lbs.) of freight handled by the railway at Harbin in Manchuria. The tax is to remain in force for a period of 10 years, and it is estimated that during that time the revenue will amount to about $625,000. This money will be chiefly used for improving the streets in Harbin, although some of it will also be used for other municipal improvements.

CATTLE AND BEEF RATES IN BRAZIL.—Argentina surpasses Brazil in both the number and the careful breeding of cattle. In the latter country the cattle business in many districts has been kept from becoming profitable by the lack of reasonable railway rates. Shipment is, therefore, conducted on a rather limited scale and driving from one point to another must often be resorted to. It is only a question of time before this method of bringing the product to market will be superseded by modern transportation facilities. Refrigerator cars are now being installed on many lines.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE BALTIMORE & OHIO is reported to be inquiring for 10 tenders. This item has not been confirmed.

THE MAINE CENTRAL has ordered 4 consolidation, 3 mikado and 3 Pacific type locomotives from the American Locomotive Company.

CAR BUILDING.

THE MONTREAL & SOUTHERN COUNTIES RAILWAY has ordered 10 high speed electric cars from the National Steel Car Company.

THE PACIFIC GREAT EASTERN, 404 Welton building, Vancouver, B. C., has ordered 44 steel frame box cars and 67 steel underframe flat cars from the National Steel Car Company.

THE MAINE CENTRAL, mentioned in the *Railway Age Gazette* of October 31 as being in the market for 10 caboose cars, has ordered that equipment of the American Car & Foundry Company.

THE GRAND TRUNK, mentioned in the *Railway Age Gazette* of December 12 as being in the market for cars, has ordered 500 steel frame stock cars and 10 steel frame baggage cars from the National Steel Car Company.

IRON AND STEEL.

THE NORFOLK & WESTERN has ordered 6,800 tons of steel rails from the Pennsylvania Steel Company, 11,600 tons from the Carnegie Steel Company, 6,800 tons from the Cambria Steel Company, and 3,800 tons from the Bethlehem Steel Corporation, a total of 29,000 tons.

SIGNALING.

The Federal Signal Company is installing an all-electric interlocking machine of 80 levers for the New York Central & Hudson River at Rome, N. Y.

FROM LONDON TO SHANGHAI IN FOURTEEN DAYS.—With the institution of a proper ferry between Nanking and Pukow, the Shanghai, Nanking and the Pukow-Tientsin have arranged a through express train service which brings Shanghai within 14 days of London.

A GERMAN LOCOMOTIVE WORKS' MONTHLY MAGAZINE.—The Hanover Locomotive Works of Linden, Hanover, Germany, began with November, 1913, the publishing of a monthly magazine. The first copy contains a history of the works. It tells how George Egestorff, the son of a lime-kiln owner, founded the foundry and engineering works at Linden in 1835. It then goes on to tell that Dr. Strousberg, a railway contractor, obtained the works in 1868. Dr. Strousberg had obtained in 1861 a concession for the construction of a railway from Insterburg to Tilsit; he was also intrusted with the construction of the Southern Railway of East Prussia. He later built on his own account several lines and thereby became the head of an important railway system. He then tried to follow out a plan of making in his own establishments nearly all the material necessary for the working of his railways, and among other plants bought that at Linden. Heavy losses just before the crisis of 1873, however, compelled him to dispose of the works in 1870 to the Hanomag. There then follows a brief discussion of the development of the works. Note is made of the fact that the first locomotive was built in them in 1846. A picture of that first locomotive is given, as well as pictures of the founder and the works as they are at the present time. The English edition contains eight pages. It is printed in an extremely pretty type and very well illustrated. If the copies to follow are as attractive and instructive there can be no doubt that the magazine will meet with success.

Supply Trade News.

The Pittsburgh Steel Products Company, Pittsburgh, Pa., has opened an office at 1933 Railway Exchange building, St. Louis, Mo., in charge of A. F. McCoole, manager of sales, and C. F. Palmer, supervisor.

The Solvay Process Company, Semet Solvay Company, Syracuse, N. Y., has moved its New York office from 100 William street to the 42nd Street Building at the corner of Madison avenue and 42nd street.

It is expected that the new plant of the American Steel and Wire Company at Fairfield, Ala., on the outskirts of Birmingham will be put in operation shortly after the first of January. The new wire and nail making machinery is being tried out now.

The American Mason Safety Tread Company, Lowell, Mass., was awarded a gold medal at the International Exposition of Safety and Sanitation, held under the auspices of the American Museum of Safety at the Grand Central Palace, New York, December 11 to 20. Certain other awards were mentioned in our news columns last week, page 1197.

The officers and engineers of the Grip Nut Company, Chicago, some 22 in number, held a meeting at the Auditorium hotel, Chicago, on December 15 and 16, and decided to build further extensions to the company's factory and install additional labor saving machinery, particularly of a character to further improve the product. The officers of the company reported excellent business.

The officers and employees of the Automatic Electric Company, Chicago, had a banquet at the Midday Club, on December 22, to celebrate the twenty-second anniversary of the manufacture of automatic telephone apparatus. The attendance was three hundred and fifty. Fifty watch fobs were presented to employees by President Harris, for efficiency and helpful suggestions made during the year.

Franklin L. Whitcomb, who has been elected president of the Griffin Wheel Company, with headquarters at Chicago, Ill., succeeding Thomas A. Griffin, was born at Worcester, Mass., on March 5, 1862. His first business experience was with a commercial wool house in Boston from 1882 to 1884. He then went to Cleveland, where he was in the boot and shoe business for two years. For two years, from 1886 to 1888, he was with the Atchison, Topeka & Santa Fe, in the purchasing department at Topeka and at Chicago, and since 1888 he has been with the Griffin Wheel Company. He was general sales agent of that company until 1909, and in that year he was elected to the vice-presidency, from which position he has just been promoted to that of president.

F. L. Whitcomb.

A six-cylinder, 150-horsepower gasolene motor car, built by the Hall-Scott Motor Car Company, West Berkeley, Cal., was recently run under its own power from Oakland, Cal., to Mason, Nev., a distance of 337 miles over the Southern Pacific, including 69 miles of two per cent. grade. A careful record of one of these cars on the Holton Lines in California for seven months shows that it averaged 2,214 miles per month, handling passenger coach trailers and freight, and the cost of operation was 13.4 cents per mile, which covers all upkeep expenses, salaries of motorman and conductor, fuel, oil, etc. The upkeep expenses, all repairs, renewals, etc., averaged $26.52 per month. The

gasolene consumption averaged one gallon to every four miles of operation.

Frank M. Gilmore, president of the E. D. E. Company, Chicago, and formerly for six years general railroad salesman of the H. W. Johns-Manville Company, died at his home in Chicago on December 18. Mr. Gilmore was born in Boston 49 years ago, and had lived in Chicago since 1891, and during most of that time has been engaged in the railway supply business. He was for several years mechanical expert of the Metropolitan West Side Elevated Railway, and for three years was connected with A. Sorge, Jr. He was for six years with H. W. Johns-Manville Co., and became president of the E. D. E. Company two years ago. Funeral services were held on Sunday, December 21. Mr. Gilmore was a well-known man in the railway supply business and had a host of friends, both among supply men and railway men.

Sidney Wright Hopkins, retired railway merchant and financier died on December 11 at the age of 77 years. Mr. Hopkins was born at Newburgh, N. Y., and began his business career in 1850. Ten years later he joined his father in the establishment of the firm of E. A. & S. W. Hopkins, importers and dealers in railway appliances and supplies and negotiators of railway and other securities in America and Europe. In 1866 he became the senior member of the firm of S. W. Hopkins & Co., which established branches in London. This firm financed the construction of the Port Huron & Lake Michigan and the Peninsular railways of Michigan, Indiana and Illinois, which were later consolidated as the Chicago & Lake Huron, which in turn was reorganized as the Chicago & Grand Trunk. In 1874 Mr. Hopkins reorganized the People's Gas, Light & Coke Company of Chicago. Among other offices, he at one time held that of president of the American Construction Company. In 1907 he became president of the Trojan Car Coupler Company of New York.

Thomas A. Griffin, whose election as chairman of the board of directors of the Griffin Wheel Company, Chicago, was announced in these columns last week, was born August 28, 1852, at Rochester, N. Y. His first business experience was as an apprentice at Rochester, and he has been in the car wheel manufacturing business continuously since 1868. He went to Detroit in 1875 and operated for the Michigan Car Company its plant known as the Detroit Car Wheel Company, manufacturing all the wheels made and used by the Michigan Car Company. In 1879 the Griffin Car Wheel Company of Detroit was organized and a foundry built by T. F. Griffin, his father, associated with T. A. Griffin and P. H. Griffin. The following year Thomas A. Griffin went to Chicago, where he organized the Griffin & Wells Foundry Company, and in 1886 this company was merged into the Griffin Wheel & Foundry Company, Mr. Griffin at this time acquiring all of the interest in the Griffin Car Wheel Company at Detroit. Subsequently the name of the company was changed to Griffin Wheel Company. Besides having five foundries in Chicago the company operates foundries in Boston, St. Paul, Detroit, Kansas City, Denver and Tacoma, and a plant is being built at Los Angeles.

T. A. Griffin.

TRADE PUBLICATIONS.

Gears.—The Mesta Machine Company, Pittsburgh, Pa., has devoted bulletin *K* to gears and rolling mill pinions. The little booklet contains illustrations of some of the gears made by the company and some of the processes in their manufacture.

Railway Lamps and Lanterns.—The Hiram L. Piper Company, Ltd., Montreal, has issued an 82-page catalog, illustrating the Hiram L. Piper train order signals and the company's line of railway lamps and lanterns, and other miscellaneous railway supplies.

Electricity in Iron Foundries.—The General Electric Company, Schenectady, N. Y., has devoted bulletin A-4167 to the subject of electricity in iron foundries. The booklet is profusely illustrated with some typical applications of G-E motors in iron foundries, and contains a chapter on foundry lighting.

Reamers and Chucks.—The McCrosky Reamer Company, Meadville, Pa., has issued a very attractive and well illustrated catalog, describing some of the company's products, including the McCrosky adjustable reamer, the Wizard chuck and collet, the Wizard variable speed and reversing attachment, the McCrosky expanding mandrel and the Searchlight universal lamp brackets.

Corrugated Metal Culverts.—The Carolina Metal Products Company, Wilmington, N. C., has issued a 24-page booklet describing the Acme nestable corrugated metal culverts. Illustrations are given which show some of the possible uses of the product and a special point is made of the fact that the culverts are nestable and can therefore be transported very easily. This company, among its other products, also sells the Imperial riveted culvert.

Self-Opening Dies.—A catalog of 35 pages has been issued by Wells Brothers Company, Greenfield, Mass., dealing with the Wells self-opening dies. This book is well illustrated and includes views of the dies in detail, as well as assembled and in use on machines. It takes up such matters as the different types of chasers, errors in lead, relief, the cutting angle, etc. An inset shows four threads which were cut with this die, the greatest variation from perfect lead at any point on any of them being not over .001 in, per in.

Wires and Cables.—The National India Rubber Company, 30 Church street, New York, has issued a 223 page catalog of rubber insulated and lead incased wires and cables. This book contains a great deal of valuable information, special attention having been given to the matter of illustrations which include considerable color work. It is accompanied by a card containing twenty samples of silk used in the covering of wire, each having a number and name for facility in ordering. Tables are included which give the freight on various sizes of wires and cables to the different states in the Union. The book also gives specifications for coverings for different classes of cables, as well as the more important extracts from the rules and requirements of the National Board of Fire Underwriters. A section is also included containing formulas and tables relating to wires and cables.

An English Idea for Lubricating Rails on Curves.—An English contemporary noting that 15 barrels of grease are used each month to lubricate rails on curves in the New York subway, and that the tracks on the curves at Times Square are greased five times every 24 hours, remarks that in England they have gone us one better in this respect. On the Liverpool Overhead and on some other railways, the rails are automatically lubricated by an ingenious arrangement as the trains pass. There is a grease box by the side of the track with a deflection bar attached to the rail. Every wheel that passes over the bar depresses it and that actuates a ratchet and pawl, causing a spur of grease to be placed on the side of the wheel before it reaches the guard rail.

An Underground Electric Railway in Argentina.—On December 2 the president of the republic of Argentina, in the presence of an important gathering of the authorities and the general public, officially inaugurated the new underground line in Buenos Ayres. The line is over two miles long and runs under the main street of the city from Plaza Mayo to Plaza Once, the terminus of the Buenos Ayres Western. It is reported that the subway is already in fine working order. The cars and stations are well ventilated and lighted and the trains travel with good speed. The people of the city are most enthusiastic, and one reason may lie in the fact that they were allowed to ride free for the first five or six days. This is the first underground electric railway in South America.

Railway Construction.

CANADIAN NORTHERN.—The Canadian parliament is being asked to extend the time for the construction and completion of lines, as follows: From Regina, Sask., southwesterly to a point on the international boundary between ranges 1 and 4, west 3rd meridian; from a point on the Rossburn branch near Russel, westerly through Yorkton, Sask., to a point on the authorized line near Goose lake; from a point 10 miles north of the line between Winnipeg and Ste. Anne, southerly to the Manitoba boundary, between ranges 2 and 4; from a point on the authorized line at or near Battleford, Sask., westerly to a point on the head waters of the Brazeau river; from a point near Regina, Sask., northerly to Humboldt, thence northeasterly down or near the valley of the Carrot river to a point at or near Pas, on the Saskatchewan river, and from a point on the line between Humboldt and the South Saskatchewan river northerly to a point at or near the crossing of the South Saskatchewan river by the Prince Albert branch. Authority is also asked for the construction of the following lines: From Calgary, Alta., westerly to Cochrane, Exshaw and Banff, from Cochrane northerly to intersect the company's line near Pigeon lake; from Cochrane southerly to Nanton, Alta. Extension of time is also being asked for the construction of lines from the authorized line between Port Arthur and Sudbury near the head of Long lake, northerly and westerly to connect with the National Transcontinental east of Lake Nipigon, Ont.; and from the authorized line between Ottawa and North Bay, near the township of Chisholm, southeasterly to the Central Ontario at or between Bancroft and Whitney, Ont.; and also the line from Port Dover to Kincardine, Ont.

Application is being made by the Central Ontario to the Canadian parliament for an extension of time for the completion of the line from the end of the present line at Central Ontario Jct., on the Canadian Pacific, to a junction with the Canadian Pacific at a point between Sudbury Jct., and Callander, Ont. G. Collins, Trenton, Ont., is general manager of the Central Ontario.

CHICAGO, MILWAUKEE & ST. PAUL.—An officer writes that a contract has been given to the J. H. Flick Construction Company, Chicago, to build a 10-mile logging road from Merrill, Wis., northwest.

DAN RIVER RAILWAY (Electric).—This company has been organized in North Carolina with $500,000 capital, it is said, to build interurban railways in Stokes and adjacent counties in North Carolina. The incorporators include H. Miller, Clemmons, and E. T. Knapp, Bethania.

EAST & WEST COAST.—An officer writes that grading work is now under way on the line from Bradentown, Fla., southeast to Arcadia, 53 miles, and the company expects to begin track laying about February 1. Allen W. Jones, president and general contractor, Bradentown. (October 17, p. 727.)

FORT WORTH-DENTON INTERURBAN.—Application has been made for a charter in Texas, it is said, to build a 32-mile line from Fort Worth, Tex., north to Denton. E. Davidson, Fort Worth, Tex., is said to be interested.

ILLINOIS MIDLAND.—Incorporated in Illinois with $25,000 capital and headquarters at Chicago, to build from the southern border of Kankakee county, Illinois, northwest to Rockford, about 120 miles. The directors include S. N. Ware, L. V. Zielke, Chicago; S. G. Durant, Philadelphia, and F. S. Munroe, Rockford.

MESKILL & COLUMBIA RIVER.—An officer of this company, which started work last year on a line from Meskill, Wash., to Grays river, 30 miles, writes that track was laid during 1913 on the section from Mays to Hope creek, 2.5 miles, and surveys are being made from Hope creek to Grays river, 14 miles. J. C. Dolphin, secretary, Meskill.

OKLAHOMA ROADS.—According to press reports plans are being made by residents of Grove, Okla., to organize a company for the purpose of building a railroad from Grove to Copeland.

PACIFIC GREAT EASTERN.—An officer writes that work is now under way by T. Welch, Vancouver, B. C., between Vancouver, B. C., and Cheakamus, on 38 miles, also between Cheakamus and Clinton on 153 miles. Track has been laid on 18 miles and surveys are being made from Clinton to Fort George, 261 miles. The company was organized some time ago to build from Vancouver, B. C., to Ft. George, a total of 350 miles.

PIEDMONT NORTHERN LINES (Electric).—An officer writes that during 1913, this company laid 26 miles of new main track between Greenville, S. C., and Spartanburg, and work is now under way on five miles to complete this section. The Parker, Brooks Construction Company and Willard, Boggs & Company, both of Greenville, and J. Thomas Bennett, Spartanburg, are the contractors.

ST. JOSEPH VALLEY.—An officer of this company, which operates a line from Elkhart, Ind., east to Angola, 59 miles, writes that in addition to the extension completed from Angola, Ind., to Berlein, in the latter part of 1912, grading work has been extended from Berlein, east, 4 miles, and will be continued to a terminus in Ohio not yet determined upon. The construction work is being done by the company's forces.

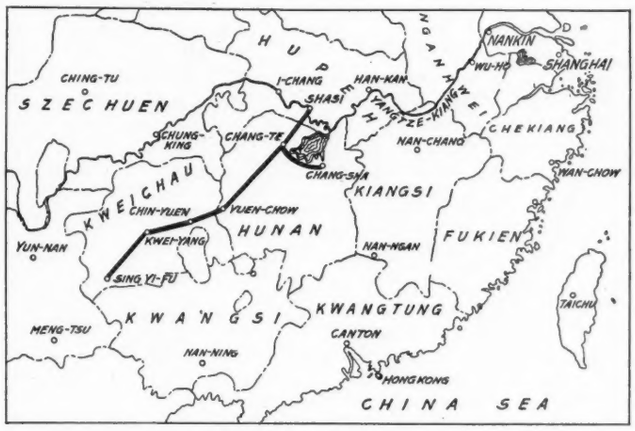
SALUDA-HENDERSONVILLE INTERURBAN.—This company has been organized in North Carolina with $150,000 capital, it is said, and headquarters at Kings Mountain, N. C. The plans call for building from Saluda, N. C., northwest to Hendersonville, about 10 miles. The incorporators include J. M. Torrance, Bessemer City, N. C.; C. E. Neisler, Kings Mountain, and U. G. Stanton, Hendersonville.

WESTON & GLENVILLE (Electric).—Incorporated in West Virginia with $500,000 capital, it is said, to build from Weston, W. Va., southwest to Glenville, about 20 miles. The incorporators include A. Edmiston, L. Bennet, and L. Rinehart.

A HIGH TENSION LINE FOR AFGHANISTAN.—A project is now under way for transmitting 44,000 volts of electrical energy to Kabul, the capital of Afghanistan, from a fall about 120 ft. high at a point 40 miles away.

OIL FUEL ON ARGENTINE RAILWAYS.—The Buenos Ayres Great Southern and the Buenos Ayres & Pacific in Argentina have recently been experimenting with oil burning locomotives with, it is said, remarkable success.

A NEW 800 MILE RAILWAY IN CHINA.—It is reported that negotiations have recently been concluded by persons representing London interests, for financing the construction of an 800 mile railway in China from Shasi, on the Yangtze river, through Chang-te, Yuen-chow and Kwei-yang to Sing yi-fu, connecting with the French line to be built from Nankin to Yun-



Portion of Map of China, Showing Proposed Road.

nan. There is also to be a branch from Chang-te to Chang-sha. The construction of this railway will inaugurate a definite railway system with Hankow or Han-kan as the center. The agreement is the first for constructing a railway in China with the contractors' profit provided for on a fixed percentage basis. Both of these ideas had been advocated by George B. Rea, an American.

Railway Financial News.

Atchison, Topeka & Santa Fe.—This company has bought the St. Louis, El Reno & Western, which has been heretofore operated as part of the Fort Smith & Western. The St. Louis, El Reno & Western runs from Guthrie, Okla., to El Reno, 70 miles.

Boston & Maine.—Theodore N. Vail, president of the American Telephone & Telegraph Company, who recently resigned as a director of the New York, New Haven & Hartford, has now resigned also as a director of the Boston & Maine.

President McDonald, of the Boston & Maine, has denied that there are any negotiations under way at the present time for the sale of control of the Boston & Maine to the Delaware & Hudson.

The directors of the Boston & Maine have written to the Massachusetts Public Service Commission in regard to the lease of the Hampden Railroad. The letter says in part: "Ratification at this time of President Mellen's execution of a lease to the Boston & Maine of the road and property of the Hampden Railroad corporation is not warranted, and the general solicitor is requested to communicate the action of the board of directors to the Public Service Commission of Massachusetts."

Chicago & Eastern Illinois.—The interest due January 1 on the 6 per cent. receiver's certificates is to be paid either at the Equitable Trust Company, New York, or the Continental & Commercial National Bank, Chicago. The additional $2,000,000 receiver's certificates which the receivers have asked permission from the court to issue will not, it is understood, be issued until after January 1.

Chicago, Milwaukee & St. Paul.—This company is offering to exchange, par for par, its own 4 per cent. debenture bonds, due 1934, for first mortgage 5 per cent. bonds of the Idaho & Washington Northern, of which there are $3,390,000 outstanding 5-year convertible 6 per cent. notes of the I. & W. N., of which there are outstanding $1,200,000; and 4-year 6 per cent. notes of the I. & W. N., of which there are $729,000 outstanding.

Delaware & Hudson.—See Boston & Maine.

Detroit, Toledo & Ironton.—The *Wall Street Journal* publishes the following plan as worked out by committees representing several classes of bondholders of the Detroit, Toledo & Ironton:

The capitalization of the old company amounts to $43,104,400. It is estimated that $4,079,955 of new money will be required to pay six months' claims, taxes, receiver's certificates, and other obligations, and for cash working capital of the new company. It is proposed that this sum be raised by offering for subscription to the old bondholders the following securities of the new company: (1) Adjustment mortgage 5 per cent. 40-year gold bonds (total authorized, $8,000,000), $6,799,823; (2) preferred stock (total authorization $6,000,000), $5,132,582; (3) common stock (total $6,500,000), $5,633,408.

The proposed capitalization of the new company will be as follows: First mortgage 5 per cent. 50-year gold bonds, redeemable at 105 and accrued interest, at the option of the new company, and secured by the new company's first mortgage to the New York Trust Company, trustee, on all the property of the new company. The total amount of bonds to be issued is not to be limited, but it will be provided that $1,000,000 shall be disposed of solely for the purpose of providing funds for rehabilitation of the property, and an additional $1,000,000 for betterments and improvements to the property.

2. $8,000,000 adjustment mortgage 5 per cent. 40-year bonds, the interest on which is to be cumulative after January 1, 1919. The bonds are redeemable as a whole at the option of the company at 70 per cent. of face value, and accrued interest during the first year; at 75 per cent. during the second year; 80 per cent. the third year; 85 per cent. the fourth year; and at 90 per cent. during the fifth year and at par thereafter. All of the above redemptions are with accrued interest. The bonds are to be secured by a mortgage to the Central Trust Company subject to the prior lien of the first mortgage.

3. $6,000,000 preferred stock, par $100, and entitled to a 4 per cent. non-cumulative dividend and to share ratably with the common stock after the latter has received 4 per cent. in dividends in any year that surplus is in excess of the payments to both stocks.

4. $6,500,000 common stock, par $100, which shall be entitled to dividends after all charges have been paid and dividend requirements on the preferred stock have been met.

On the basis provided, owners of the various securities will receive in exchange for their holdings and for each $1,000 paid the following:

Class of securities:	Adjustment Bonds.	Preferred Stock.	Common Stock.
Ohio Southern bonds.....	$1,666.66	$1,571.42	$1,571.42
General lien bonds.....	1,666.66	1,428.57	1,428.57
General lien coupons, due Dec. 1, 1909	1,666.66	800.00	1,200.00
Receivers' certificates, order of February 24, 1908.....	1,666.66	800.00	1,200.00
Consolidated bonds	1,666.66	500.00	1,000.00

Members of the reorganization committee are William Church Osborn, chairman; Otto T. Bannard, president New York Trust Company; Sydney C. Borg and F. H. Ecker.

Erie.—This company has asked the New York Public Service Commission, Second district, for permission to issue $2,000,000 general lien first consolidated mortgage bonds.

Hampden Railroad.—See Boston & Maine.

Minneapolis, St. Paul & Sault Ste. Marie.—This company has asked permission of the Wisconsin railroad commission to guarantee principal and interest $1,280,000 equipment trust certificates, dated December 1, 1913, due semi-annually from December 1, 1914, to December 1, 1923.

New Orleans, Mobile & Chicago.—W. F. Owen, president, has been appointed receiver on petition of the Metropolitan Trust Company, New York, trustee of the $12,000,000 5 per cent. bonds, interest payment on which is now due and not paid. The road is controlled jointly by the St. Louis & San Francisco and the Louisville & Nashville.

New York Central & Hudson River.—The Public Utility Commission of New Jersey has given its permission for the new consolidation mortgage for $167,000,000, which is incidental to the general plan of retirement of Lake Shore & Michigan Southern collateral trust 3½ per cent. bonds.

Holders of about $59,000,000 of the Lake Shore & Michigan Southern collateral 3½ per cent. bonds have, it is understood, already consented to the plan, and consent from the holders of $9,000,000 more will give the necessary three-quarters approval.

Pennsylvania Railroad.—The total stockholders of the Pennsylvania now number 86,865. Of these stockholders more than 48 per cent. are women.

St. Louis, El Reno & Western.—See Atchison, Topeka & Santa Fe.

Western Maryland.—This company has asked permission of the Maryland Public Service Commission to issue $5,000,000 18 months 6 per cent. notes, a part of the proceeds of which are to be used to pay off $3,000,000 one-year notes which fall due January 1.

Duty Free Coal for a Russian Railway.—The Russian cabinet has approved the importation, free of duty, of foreign coal for the need of the South-East Railway.

Railway Station Gardens in England.—The Great Western awarded 19 prizes this year to station masters and others responsible for the upkeep of station gardens. The rivalry shown was so keen and the results so excellent that the company has decided to increase its annual prize allowance from $1,250 to $1,500. Eleven stations received the special prizes of $25 apiece.